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metals review

the news digest magazine

published by the american society for metals

Volume XXVII-No. 4 April, 1954

HOLDEN SALT BATHS FROM STOCK

F. O. B., New Haven, Connecticut, Detroit, Michigan, Los Angeles, California

LIQUID CARBURIZING BATHS AND CARBON REAGENTS—WATER SOLUBLE

	Case Depths	Operating Temperature Range	
Light Case 50	.001 - .005	1400 - 1650°F.	Carbon A
Light Case 200	.001 - .010	1400 - 1650°F.	Carbon D
Hard Case 250	.001 - .025	1400 - 1650°F.	Carbon E
Hard Case 400	.001 - .040	1450 - 1750°F.	
Hard Case 500	.001 - .075	1450 - 1750°F.	
Hard Case 600 for replenishment only		1450 - 1750°F.	

DO THE FOLLOWING THINGS:

1. Increase Electrode Life. 2. Increase ceramic pot life. 3. Increase alloy pot life.

NEUTRAL SALT BATHS with ADDITIVES

Hardening 185-10	1000 - 1500°F.
Hardening 127-11	1300 - 1650°F.
Hardening 127-12	1300 - 1650°F.
Hard Brite AA-10	1450 - 2000°F.

High Speed Hardening Baths with Additives

High Speed Preheat 13-17-10	1200 - 1700°F.
High Speed 17-24AA-10	1750 - 2350°F.
High Speed 17-22AA-10	1700 - 2300°F.
Hy-Speed Case	950 - 1150°F.

TEMPERING BATHS:

Tempering 2	500 - 1100°F.
Tempering 310A, fused	325 - 1100°F.
Tempering 350 Pink	325 - 1100°F.

ANNEALING BATHS:

Anneal 975	1075 - 1650°F.

MARQUENCHING & AUSTEMPERING:

Marquench 296

Marquench Additive 356,—to clear up chlorides in austempering-martempering baths.

RECTIFIERS:

Rectifier A—for special descaling operations or added cleaning.

QUENCHING OILS:

Clear Quench Quench 500 Martoil Martoil K

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Invitation to Entrants

9th metallographic exhibit

Entries are invited in the 9th Metallographic Exhibit, to be held during the National Metal Exposition in Chicago the week of Nov. 1 through 5, 1954. Entries will be displayed to good advantage and awards will be given for the best micrographs as decided by a committee of judges.

CLASSIFICATION OF MICROS

1. Toolsteels and tool materials
2. Stainless steels and heat resisting alloys
3. Other steels and irons, cast or wrought
4. Aluminum, magnesium, beryllium, titanium and their alloys
5. Copper, nickel, zinc, lead and their alloys
6. Metals and alloys not otherwise classified
7. Series showing transitions or changes during processing
8. Welds and other joining methods
9. Surface phenomena
10. Results by unconventional techniques (other than electron micrographs)
11. Slags, inclusions, refractories, cermets

RULES FOR ENTRANTS

Work which has appeared in previous metallographic exhibits held by the American Society for Metals is unacceptable. Photographic prints shall be mounted on stiff cardboard; maximum dimensions should be limited to 15 by 22 in. Heavy, solid frames are not permissible because of difficulties in mounting the exhibit. Entries should carry a label ON THE FACE of the mount giving:

Classification of entry
Material, etchant, magnification
Any special information as desired

The name, company affiliation and postal address of the exhibitor should be placed ON THE BACK of the mount.

Transparencies or other items to be viewed by transmitted light must be mounted on light-tight boxes wired for plugging into lighting circuit, and built so they can be fixed to the wall.

Entrants living outside the U.S.A. should send their micrographs by first-class letter mail endorsed "Photo for Exhibition—may be opened for customs inspection". To be acceptable as first-class mail the package should measure no more than 35 x 45 cm. (14 x 18 in.)

Exhibits must be delivered before Oct. 15, 1954, either by prepaid express, registered parcel post or first-class letter mail.

Address: National Metal Exposition
International Amphitheater
43rd and Halsted Sts.
Chicago 9, Ill.

AWARDS AND OTHER INFORMATION

A committee of judges will be appointed by the Metal Congress management which will award a First Prize (a medal and blue ribbon) to the best in each classification. Honorable Mentions will also be awarded (with appropriate medals) to other photographs which, in the opinion of the judges, closely approach the winner in excellence.

A Grand Prize, in the form of an engrossed certificate and a money award of $100, will also be awarded the exhibitor whose work is adjudged best in the show, and his exhibit shall become the property of the American Society for Metals for preservation and display in the Society's headquarters.

All photographs may be retained by the Society for one year and placed in a traveling exhibit to the various Chapters. They will be returned to the owners in May 1955 if so desired.

36th National Metal Congress and Exposition

Chicago, Ill. **November 1 to 5, 1954**

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Metals Review

THE NEWS DIGEST MAGAZINE • VOLUME XXVIII, No. 4 April, 1954

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Metals Handbook Supplement To Be Published in Summer

A "1954 Supplement" to the 1948 edition of A.S.M. Metals Handbook will be ready for distribution during the summer, according to an announcement by W. H. Eisenman, national secretary of the American Society for Metals.

The Supplement will contain some 23 sections adding to the major subdivisions of the 1948 Handbook and also providing new articles on certain subjects never before dealt with in the Handbook. The Supplement will contain about 200 pages similar in size and style to the pages in the present Handbook—that is, it will be a reference volume containing approximately 300,000 words.

In order that A.S.M. members may receive this additional Handbook material as promptly as possible and at no charge, the entire 200-page Supplement will be incorporated in an extra (13th) issue of the Society's monthly magazine, *Metal Progress*. This "Bonus Issue" of *Metal Progress* will be off the press at midyear and will be mailed to all members of the Society. Members need not order the publication—it will be sent to all at no charge, as soon as available. The entire midyear issue will be devoted to these Metals Handbook articles and will be circulated to all A.S.M. members and *Metal Progress* subscribers in addition to the 12 regular issues.

For the benefit of those members who may prefer to have the 1954 Handbook Supplement in bound form, it will be issued as a separate hard cover volume, at a nominal charge. A later announcement will give a definite price and instructions for ordering the bound Supplement.

It should be noted that the 1948 edition of the *Handbook* is not being replaced, but merely supplemented, and the 1948 volume should *not* be returned to headquarters when the Supplement is received.

The material to be included in this supplement can be subdivided roughly into three categories, namely—metals, processes and design. Information in the 1948 Handbook will be supplemented with new material on the following metals: alloy steel, stainless steel, toolsteel, nodular iron, heat resisting alloys, aluminum, copper, magnesium and titanium. Under processes, new and revised information will be provided on forming, machining, heat treating, steel production, cleaning and finishing, mechanical testing, nondestructive inspection, metallography. Design problems will be covered in articles on engine wear, stress concentration, brazed joints, shot peening, powder metal parts, design of castings.

All of the material on these 23 subjects is being prepared by 23 technical committees of the A.S.M., under the general direction of the Metals Handbook Committee. A total of 154 top engineers and metallurgists are contributing through these committee activities. Each article will be the product of a group of experts working together to give a balanced view of the best current practices in their respective fields.

Chairman of the A.S.M. Metals Handbook Committee is E. O. Dixon, vice-president in charge of research and metallurgy, Ladish Co. Chairmen of the various technical committees are as follows:

Committee on Carbon and Alloy Steel—M. L. Frey, assistant to general works manager, tractor plants, Allis-Chalmers Mfg. Co.

Aluminum—J. B. Johnson, chief, metallurgical group, Aeronautical Research Laboratory, Wright-Patterson Air Force Base.

Design of Brazed Joints—Robert H. Leach, director and technical consultant, Handy and Harman.

Design of Ferrous Castings—H. Bornstein, metallurgist, Moline, Ill.

Copper—R. G. Thompson, engineering manager, materials and process subsection, Major Appliance Division Laboratories, General Electric Co.

Engine Metals — T. E. Eagan, chief metallurgist, Cooper Bessemer Corp.

Forming of Sheet Steel—R. C. W. Peterson, president, Peterson Engineering Co.

Heat Resisting Alloys—Howard C. Cross, Battelle Memorial Institute.

Heat Treatment—T. A. Frischman, chief metallurgist, Axle Division, Eaton Mfg. Co.

Machining—Hans Ernst, director of research, Cincinnati Milling Machine Co.

Magnesium — N. E. Promisel, head Materials Branch, Navy Department.

Mechanical Testing—Oscar J. Horger, chief engineer, Railroad Division, Timken Roller Bearing Co.

Metal Cleaning—Braly S. Myers, chemical engineer, International Harvester Co.

Metallography—George L. Kehl, department of metallurgy, Columbia University.

Nodular Iron—Richard A. Flinn, department of chemical and metallurgical engineering, University of Michigan.

Nondestructive Inspection—Don M. McCutcheon, consultant in engineering-physics, Madeira Beach, Fla.

Powder Metallurgy—William A. Reich, Carboloy Division, General Electric Co.

Shot Peening—J. E. LaBelle, chief metallurgist, Detroit Diesel Engine Division, General Motors Corp.

Stainless Steel—Russell Franks, manager, development, Electro Metallurgical Co.

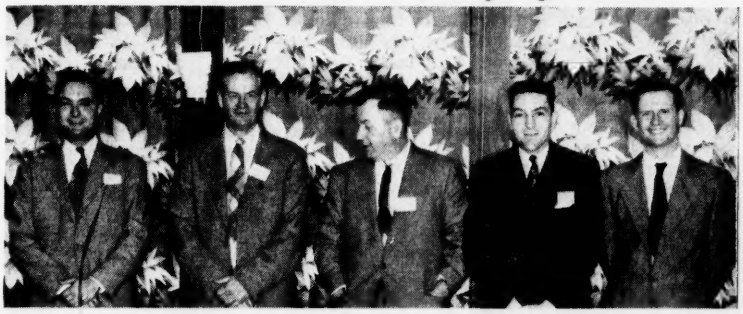
Steel Melting—George V. Luerssen, vice-president in charge of metallurgy, Carpenter Steel Co.

Stress Concentration—R. E. Peterson, manager, Mechanics Division, Westinghouse Research Laboratories, Westinghouse Electric Corp.

Titanium—Bruce W. Gonser, technical director, Battelle Memorial Institute.

Toolsteel—W. R. Frazer, chief metallurgist, Union Twist Drill Co.

Conduct Series on Alloy Systems



Speakers Who Discussed the "Analysis of Alloy Systems" During the Oak Ridge Chapter's First Series of Educational Lectures Included, From Left: H. L. Yakel, Jr.; J. H. Frye, Jr.; L. K. Jetter; G. E. Klein; and J. O. Betterton, Jr. All the speakers are members of the Oak Ridge Chapter

"Analysis of Alloy Systems" was selected by the Oak Ridge Chapter for its first educational lecture series. All the speakers are members of the Oak Ridge National Laboratory.

H. L. Yakel described the fundamental aspects of diffraction which is a valuable tool in metallurgical research. The advantages and limitations of X-rays and neutrons in crystal structure determinations were stressed.

Gilbert Klein described the practical aspects of X-ray diffraction and indicated how the disappearing-phase method or the change in lattice parameter can be used for phase boundary location.

L. K. Jetter described the various techniques used for the determination of metal textures and exhibited pole figures illustrating rod textures that arise from extrusion and wire drawing.

J. H. Frye presented an excellent review of thermodynamic principles and illustrated how phase equilibria can be correlated with free energy considerations.

J. O. Betterton, who recently studied under Dr. Hume-Rothery of England, described some current methods used to determine equilibrium diagrams. The special techniques used in metallurgical specimens with precious metals were particularly interesting to the Oak Ridgers.

A second educational series, which began in February, features N. J. Grant of Massachusetts Institute of Technology, who is speaking on the "Elements of High-Temperature Metallurgy".—**Reported by Anton de Sales Brasunas for the Oak Ridge Chapter.**

Metallurgical, Inc., Opens

The new multi-million dollar plant of Metallurgical, Inc., was opened in Minneapolis recently to serve the North Central States metal finishing industries. The plant incorporates all of the latest equipment for treating ferrous and nonferrous metals.

Steel Producing Methods Compared at Mahoning's Openhearth Night Meeting

Speaker: W. O. Philbrook

Carnegie Institute of Technology

W. O. Philbrook, associate professor of metallurgical engineering at Carnegie Institute of Technology, gave a talk on the "Application of Engineering and Science in Steelmaking" at the Openhearth Night Meeting in Mahoning Valley.

The principal theme of the address was the openhearth process as a fuel-fired operation in comparison with competing processes. Mr. Philbrook stated that the basic openhearth furnace accounts for about 88% of steel production, the Bessemer converter approximately 4%, and the electric furnace about 8%. Electric furnace production has been accounting for a steadily larger percentage during very recent years.

The initial cost of an electric furnace plant is about 60% of the cost of an openhearth plant for similar tonnage, due principally to the elaborate fuel and air system required for each openhearth unit. However, this disadvantage is offset by the higher operating cost for the electric furnace plant, the principal factor being the higher cost of electricity as compared to fuel oil. The over-all cost depends on raw material costs, and location of the plant greatly affects this situation.

The openhearth furnace is only about 20% efficient thermally. Most of the heat supplied is carried out in the waste gases or lost to surroundings by radiation and convection as a necessary cost of maintaining the furnace at a high temperature. By contrast, the electric furnace is nearly 50% efficient.

The metallurgical heat requirement in the openhearth is about 0.8 million Btu. per ton of ingots, varying upward or downward with the proportion of scrap in the charge. The production rate depends on how rapidly the necessary high-temperature heat is supplied. Increases in production rate can be obtained by increasing the flame temperature and the radiating power or luminosity of the flame, decreasing the thermal requirement as by the use of oxygen for decarbonization or by contriving to burn fuel at a faster rate within the furnace.

Many examples were presented to illustrate these principles and particularly to show the importance of the checker chambers in the success of the openhearth process. The adverse effect of air leakage below floor level was emphasized, although enough infiltration through the doors to provide the air for metallurgical oxidation, equivalent to about 20% of the air required to burn the fuel, is advantageous. One interesting conclusion was that oxygen for combustion offers no advantage unless the fuel rate is increased at the same time, and this involves some risk of decreased refractory life.

In summary, Professor Philbrook stated that economical operation of the openhearth to stay abreast of its competitors is favored by: A tight regenerative system of adequate capacity to give high air preheat temperatures; minimum metallurgical heat requirement, aided by oxygen for decarbonization together with reduced limestone and increased hot metal in the charge when possible; and maintaining the maximum safe fuel input rate at all stages of the heat.—**Reported by John D. Anderson for Mahoning Valley.**

Cleveland Chapter Sets Up Donaldson Scholarship

To commemorate the contributions of K. H. Donaldson, head of the metallurgical department at Case Institute of Technology until his death in 1953, the Cleveland Chapter A.S.M. has established the K. H. Donaldson Scholarship to assist a deserving student in obtaining a metallurgical engineering education at Case. The annual award of $400 will be given to a member of the freshman class for use in his sophomore year.

The student will be selected on the basis of his desire to pursue a metallurgical curriculum, need for financial assistance, and personal qualifications of good scholarship, sound character, wholesome personality and professional promise.

"Doc" Donaldson, as he was affectionately called by his students and associates, had been a member of the Cleveland Chapter since 1939, and had assisted the Chapter at every opportunity.—**Reported by R. M. Baker for the Cleveland Chapter.**

Mehl Delivers Burgess Memorial Lecture in Washington

Speaker: Robert F. Mehl
Carnegie Institute of Technology

The George Kimball Burgess Memorial Lecture is the midpoint and climax of the season's technical program of the Washington Chapter. Instituted in 1941 to honor and perpetuate the memory of George Kimball Burgess, fourth president of A. S. M. and former director of the National Bureau of Standards, the series was interrupted by restrictions occasioned by the war but resumed in 1951. The Washington Chapter invites metallurgists of outstanding stature to deliver this lecture and the sustained caliber of the series is attested by the impressive register of Burgess lecturers—Paul Mercia, Herbert French, Marcus Grossmann, Samuel Hoyt and, in 1954, Robert Mehl, director of Metals Research Laboratory and head of the department of metallurgy, Carnegie Institute of Technology, Pittsburgh.

Professor Mehl chose as his subject "The Formation of Ferrite From Austenite in Hypo-Eutectoid Steels". The importance of the subject is obvious, since a heavy majority of the tens of millions of tons of steel produced yearly are hypo-eutectoid and are applied in the slowly cooled state. It is, therefore, at first glance, surprising that our understanding of the forces which control the structure of the ferrite in this metallurgical staff of life is so meager. The extreme complexity and the many experimental difficulties encountered in the course of research on this problem clearly explain why progress here has tended to lag behind research in other fields of metallurgy. The work Professor Mehl and his students have accomplished at Carnegie Tech has contributed greatly to the understanding of the principles underlying the formation of ferrite.

The data presented by Professor Mehl were drawn principally from works, heretofore largely unpublished, of Dube and Mehl, and Aaronson and Mehl, and dealt with the kinetics of formation and the growth and morphology of ferrite and bainite. Examples of the several shapes assumed by ferrite, ranging from thin, intergranular shells enveloping pearlite colonies, through various types of spiny Widmanstatten ferrites, to large idiomorphic crystals, were illustrated by many slides, and the mechanisms and processes responsible for the dissimilarity of the several forms of ferrite were explained.

Professor Mehl reviewed the theories proposed to explain the genesis of bainite, and concluded that this structure comes into being by a process of nucleation and growth. But the forces which control the nucleation of bainite and the factors which regulate its growth are not well understood. Recent findings at Carnegie Tech suggest that the relative orientation of adjacent austenite grains exercises a strong controlling influence on the precipitation of bainite. Professor Mehl concluded that the morphology of bainite is similar, in many respects, to that of ferrite, in that a supersaturated ferrite first forms, and carbide later precipitates to form the aggregate we know as bainite. Upper and lower bainite are both formed in this manner, even though their appearance is quite different. For this reason, Professor Mehl concludes that all bainites are alike structurally and that the common practice of differentiating between "upper" and "lower" bainite is faulty terminology, just as the distinction between pearlite and troostite was before their sameness was demonstrated.

The members of the Washington Chapter were impressed by the fundamental approach and lucid treatment of this important problem, and are justly proud of the sustained quality of the George Kimball Burgess lecture series.—**Reported by Richard Raring for the Washington Chapter.**

Builds New Plants

C. I. Hayes, Inc., Providence, manufacturers of electric furnaces, has announced plans to build a new modern plant in Cranston, R. I. The new plant is expected to triple the company's present furnace manufacturing facilities.

Discusses New Presses at Worcester

Present at the January Meeting in Worcester Were, From Left: Stephen J. Jablonski, Technical Chairman; George W. Motherwell, Vice-President of Manufacturing, Wyman-Gordon Co., Who Spoke on "What's New in North Grafton"; H. J. Elmendorf, Chapter Chairman; and Joseph C. Danec

Speaker: George W. Motherwell
Wyman-Gordon Co.

In a talk entitled "What's New in North Grafton", George W. Motherwell, vice-president in charge of manufacturing, Wyman-Gordon Co., discussed the $50-million expansion of the 8-year old Wyman-Gordon plant before the Worcester Chapter.

The new plant will accommodate two of the world's largest hydraulic forge presses, together with the furnaces, power plant and engineering, die making and quality control equipment to serve them.

The presses will be used to manufacture the largest, strongest, lightest parts now possible for use in armed forces aircraft. Mr. Motherwell stated that the plant is owned by the U. S. Government and operated by Wyman-Gordon, selected for the project largely because of the company's experience in the forging of a great variety of metals.

The expansion amounts to supplementing the 18,000-ton press in use since 1946 with two larger presses capable of exerting 35,000 tons and 50,000 tons pressure, respectively, on the dies used in forming the forgings.

Mr. Motherwell explained that forged aircraft parts are desirable because forgings have custom grain flow and consequently greater strength than parts machined from slabs. Forging is also less wasteful of metal than machining. Large forgings have a greater strength-to-weight ratio and allow for a lighter finished airplane, thereby increasing fuel capacity and resulting in greater range.

Mr. Motherwell showed slides illustrating castings and other parts going into the construction of the new presses. Color movies showed the 18,000-ton press in operation forging aluminum from ingots into aircraft parts and illustrated the process by which the forgings are designed and how their dies are cut by tracing from wooden models and templates.—**Reported by Stephen M. Jablonski for the Worcester Chapter.**

New York Holds Luncheon for Science Educators

At the Luncheon Sponsored by the New York Chapter A.S.M. to Arouse Interest of High-School Students in Metallurgy as a Profession Were, Standing, From Left: M. Meister, Principal, Bronx High School of Science; G. L. Kehl, Chairman, New York Chapter's Educational Committee; L. Jarvie, Dean, State University; C. F. Pertsch, New York City Board of Education; W. Stadtler, New York Chapter Vice-Chairman; J. Wortman, Acting Principal, Stuyvesant High School. Seated, from left, were: S. Schenberg, New York City Board of Education; H. Templeton, New York State Education Department; A.S.M. national president James B. Austin; Lt. Gen. L. R. Groves, speaker; and N. Russell, New York chairman

Speaker: Leslie R. Groves

Former Head—Manhattan Project

As part of a long-range plan to interest high school students in the profession of metallurgy, the Educational Committee of the New York Chapter under the chairmanship of George L. Kehl, entertained at luncheon key personnel of several high schools in the Metropolitan area. The luncheon was held at the Men's Faculty Club of Columbia University, and the guests were science teachers and student advisors of the Bronx High School of Science, Brooklyn Technical High, and Stuyvesant High School, officers of local Teacher Science Clubs and officials of the New York City and State Boards of Education. Lieutenant General Leslie R. Groves, former head of the Manhattan Project, spoke.

Heading the list of prominent A.S.M. members acting as hosts to the group were James B. Austin, A.S.M. national president, Neal Russell, New York Chapter chairman, and past chairmen of the New York Chapter. Chapter executive and educational Committee members also attended.

General Groves described the pressing problem of recruiting potential engineers from our high schools as stemming in large part from an inadequate preparation in mathematics. The General observed that grade school training lacks the proper perspective, with students afraid of anything resembling arithmetic; today, the bright student is held back to the level of the slower ones where, formerly, the poor students were allowed to fall by the wayside. This mathematical training is essential and is the backbone of any later technical training.

General Groves also pointed out that money must not be the sole basis upon which the student should select his career. In the case of engineering, the engineer can look back and point to something constructive and enduring of which he can be proud. The feeling of creating something of service to self, country, and mankind is of prime importance to the engineer.

To relieve the current shortage without resorting to long-term planning, General Groves pointed to the fact that engineers are not all engaged in "Engineering". That is, engineers in most firms are called upon to do all sorts of paper work, which could be handled by others, thus releasing the engineer from all but engineering functions. Unfortunately, this tends to "narrow" the engineer in that he loses the advantage of knowing just what sort of things his staff does and thus he has a more shallow understanding of his managerial function. Working up through the ranks makes for better appreciation of the problems and routine of the engineer's staff.

The present shortage of potential engineers is a result of poor public relations between the profession and the country's youth, which has allowed the idea to grow up in the minds of students that "because a boy can't bat like Babe Ruth, he shouldn't play baseball". This absurd idea has stuck insofar as engineering is concerned.

There are tremendous opportunities in some phases of the sciences and engineering for women, yet, women, in general, have not been approached. In conclusion, the General stated that the country is definitely being weakened by the lack of engineers.

At the close of the meeting, Chairman Russell, who served as presiding officer at the luncheon, presented General Groves with an inscribed copy of John A. Kouwenhoven's book. *The Columbia Historical Portrait of New York.*—**Reported by Lewis W. Berger for the New York Chapter.**

Penn State Hears Talk On Diffusion of Metals

Speaker: John W. Cahn

John W. Cahn spoke to the Penn State Chapter on "Diffusion in Metals" recently. The discrepancy in the data available in the literature concerning diffusivity values and energies of activation was made evident by Dr. Cahn. A discussion of Darken's theory of compound diffusivity values was presented with advantages and shortcomings being brought out, and several alternative approaches to the problem were proposed. Various diffusion mechanisms were considered by the speaker, who also pointed out ideal experimental conditions of using isotopes for self-diffusion studies.—**Reported by Bennie F. Oliver for Penn State.**

Speaks at Los Alamos Chairmen's Night

A. S. Coffinberry (Left), Technical Chairman of a Meeting of the Los Alamos Chapter, Introduced the Speaker, R. M. Brick, Towne Scientific School, University of Pennsylvania, Who Gave a Talk on the "Effect of the Order-Disorder Reaction on the Mechanical Properties of Beta Brass"

Speaker: R. M. Brick
University of Pennsylvania

The past chairmen of the Los Alamos Chapter were honored at a recent meeting. **Frank Kubosch, past** chairman (1946-47), spoke briefly about the early days of the chapter and introduced three other past chairmen who were present: Arthur S. Coffinberry (1949-50), C. Gordon Hoffman (1951-52) and Finley H. Ellinger (1952-53). A past-chairman's certificate was presented to Finley Ellinger.

The speaker, R. M. Brick, director of metallurgical engineering, Towne Scientific School, University of Pennsylvania, gave a talk on the "Effect of the Order-Disorder Reaction on the Mechanical Properties of Beta Brass". Although beta brass is unimportant industrially, and the effect of the order-disorder reaction on its mechanical properties may not be proof of an important scientific theory, it is, nevertheless, an extremely interesting alloy.

Ordering in an alloy generally results in some changes in its properties which tend to make it more like a pure metal (e.g., increased electrical conductivity). When there is a phase change (e.g., cubic to tetragonal AuCu) hardening results from periodic lattice distortions associated with tetragonality gradients. In beta brass, no such lattice distortions occur and no hardening would be predicted. However, the yield strength may be increased five-fold by quenching from the 50% ordered state at 45° C. Softening subsequently occurs at low temperatures, 25 to 150° C., with a very low activation energy and an increase in density.

Dr. Brick postulated that if ordering is not suppressed by very rapid quenching, then a large number of vacancies must be present in the structure. Trapping these vacancies within the structure results in strengthening (and hardening) it. On the other hand, if the vacancies are allowed to diffuse out of the structure, as in aging at low temperatures, the strength is reduced and the alloy softened. Hence it appears that two processes are involved. One process, hardening, results when the vacancies are trapped within the structure and depends on the cooling rate and quenching temperature; the other process, softening, results when the vacancies are allowed to diffuse out of the structure and depends on the aging time and temperature.—**Reported by W. N. Miner for Los Alamos.**

Honored at a Recent Meeting of the Los Alamos Chapter Were the Following Past Chairmen, From Left: C. Gordon Hoffman (1951-52); A. S. Coffinberry (1949-50); Frank Kubosch (1946-47); and F. H. Ellinger (1952-53)

Cincinnati-Columbus-Dayton Hold 16th Annual Meeting

The Cincinnati, Columbus and Dayton Chapters of the American Society for Metals held their sixteenth Annual Tri-Chapter Meeting in Cincinnati on Apr. 1, 1954.

The program consisted of the following papers and speakers:

"Brittle Behavior of Metals at Low Temperatures", by C. H. Lorig, Battelle Memorial Institute.

"Relationship of Stress Corrosion to Failures", by Julius J. Harwood, head, Metallurgical Branch, Office of Naval Research.

"Relationship of Heat Treatment and Machining to Steel Failures", by J. D. Graham, works metallurgist, International Harvester Co.

"Application of Experimental Stress Analysis to Machine Development", by A. H. Pickford, research engineer, Caterpillar Tractor Co.

"Service Failures of Metals in High-Temperature Service", by John J. B. Rutherford, chief metallurgist, Babcock & Wilcox Co., Tubular Products Division.

The meeting commenced with registration from 9:30 to 10:00 a.m., and adjourned at 9:30 p.m. Luncheon and dinner were served in the dining room of the Engineering Society Headquarters Building.

Form New Company

Techalloy Co., Inc., has recently been formed to specialize in the drawing and rolling of Monel, nickel, Inconel and Techalloy stainless steels. D. M. Schmid, chairman of the Philadelphia Chapter A.S.M. and an active committee member of the Chapter for the past 16 years, is president of the new company, and Ralph Cubbler, a member of the Philadelphia Chapter, is vice-president and secretary.

Mr. Schmid was formerly vice-president and general manager, and Mr. Cubbler general superintendent of the Alloy Metal Wire Co.

Inland Empire Hears Atomic Expert on Weapons

Speaker: Richard V. Paulson

Kaiser Aluminum and Chemical Corp.

Richard V. Paulson, research chemist for the Kaiser Aluminum and Chemical Corp.'s department of metallurgical research, presented a discussion on "Atomic Weapons" before a meeting of the Inland Empire Chapter.

Mr. Paulson's discussion covered the various types of atomic bursts, their effect on human beings and the different types of protective structures required for protection. He pointed out that a high airburst is the most likely method of attack due to the correspondingly larger area of destruction than in a surface or subsurface burst.

The methods and materials that might be used by the average citizen in constructing home-made shelters are varied. However, Mr. Paulson felt that one of the simplest and most satisfactory shelters is a lean-to composed of two layers of heavy timbers constructed against a basement wall.

In the event that one is caught away from a conventional-type shelter, some protection may be gained by taking cover in or under an automobile. This will protect one from flying debris, the greatest casualty-producing factor in an atomic blast.

Mr. Paulson concluded by discussing the role of radiation monitors and radiation detection devices that would be used in the event of an atomic attack.—**Reported by Helen Goerig for Inland Empire.**

Texas' Western Night

James B. Austin, A. S. M. National President, Spoke Before the Annual Western Night Meeting of the Texas Chapter on "Magnification in Time". Chairman W. Mack Crook has just presented Mr. President with a Western hat

Receives ASM Scholarship in Ontario

J. H. Pope (Left), Member of the Executive Council of the Ontario Chapter, Is Shown Presenting the A. S. M. Scholarship Award of $50 to John E. Edyt, Student at Ryerson Institute of Technology, for Proficiency in First-Year Metallurgy. (Reported by H. M. Braid for the Ontario Chapter)

Speaks on Field-Emission Microscopy at Penn State

Speaker: Erwin W. Mueller

Pennsylvania State University

Erwin W. Mueller, professor of physics at the Pennsylvania State University, presented a demonstration lecture on "Field-Emission Microscopy" at a meeting of the Penn State Chapter.

Professor Mueller pointed out the need for investigations of surface reactions having orders of magnitude equivalent to a mono-atomic layer. With the greater resolving power that is inherent in the field-emmission microscope (ten times more efficient for thin surface layers than the standard electron microscope), new details concerning surface behavior are being revealed which are paving the way for intensive study of the region where oxidation, reduction, surface migration and other chemical reactions take place.

Attention was brought to the latest development in field-emission microscopy, the use of positive ions instead of electrons. In this work adsorbed atoms are removed from the surface of the cathode tip as positive ions by the application of a very high positive field strength. Because of the smaller tangential velocity in comparison to that of the electrons, more surface details become evident. This ion microscope provides the highest resolving power of all known arrangements.

After showing a movie made of the adsorption, migration and evaporation of individual atoms and monomolecular layers, he domonstrated the actual use of the instrument with a small working model of the field-emission microscope.—**Reported by W. B. Collins for Penn State.**

St. Louis Concludes Successful Course on Inspection of Metals

The St. Louis Chapter has just concluded five evening lectures on "Inspection of Metals" at the Union Electric Co.'s auditorium. Speakers for the most part were selected from the St. Louis area, and all were exceptionally well qualified on their chosen topics. The text, "Inspection of Metals", by H. B. Pulsifer, was used for reference material. Subjects and speakers were:

"Chemical Tests", by C. D. Towbridge, St. Louis Testing Laboratories; "Mechanical Tests", by R. N. McGee, Jones and Laughlin Steel Corp.; "Visual Tests", by John Patton, General Steel Castings; "Microscopic Tests", by Karl Kaveler, United States Defense Corp.; and "Specifications and Review", by B. J. Esarey, National Bearing Division, American Brake Shoe Co.

Pacific Northwest Officers Hold Joint Meeting

Representatives of the Five Pacific Northwest Chapters Held a Meeting in Seattle Recently to Prepare Plans for Future Activities of the Organization in Their Respective Communities and to Confer With National Secretary W. H. Eisenman. Present were, from left: A. L. Groves, Inland Empire; Monte Parker, Puget Sound; A. H. Roberson, Oregon; J. E. Gustafson, Oregon; B. R. Elder, Columbia Basin; A. D. Harding, British Columbia; L. P. Carter, British Columbia; National Secretary W. H. Eisenman; C. R. Lundy, Puget Sound; R. S. Dalrymple, Columbia Basin; Fred Theiss, Oregon; and G. S. Fergin, Inland Empire. Puget Sound was host for the meeting

Talks in Baltimore On Alloying Effects Of Deoxidizers

Speaker: Walter Crafts

Electro Metallurgical Co.

Walter Crafts, associate director of research, metals research laboratories of the Electro Metallurgical Co., a division of Union Carbide and Carbon Corp., spoke on "Alloying Effects of Deoxidizers", at a meeting in Baltimore recently.

Mr. Crafts briefly described an "alloy" in steel as an element which, when added in small amounts, produces an increase of strength by substitutional solid solution or by its influence on carbide characteristics. Deoxidizers, on the other hand, exert their alloying effects through their reactions with other interstitial solution elements such as oxygen, sulphur and particularly nitrogen. Aluminum, zirconium, titanium and vanadium are examples of deoxidizers; they exert a powerful influence on grain size, austenite stability and mechanical properties.

The control of grain size was discussed in the light of the theory that grain growth is inhibited by small insoluble particles of oxide, sulphide, nitride and carbide. Where the solubilities of carbides and nitrides are known, there is good correlation between grain growth and resolution of the insoluble particles.

The effects of deoxidizers on austenite and carbide stability with respect to hardenability, abnormal pearlite divorce and graphitization were shown to result from a number of reactions, such as the stabilization of nitrogen and the nucleating effects of oxide particles. Each deoxidizer has a specific effect on these complex reactions; whereas small amounts of aluminum tend to promote abnormality and accelerate ferrite rejection in the pearlite range of austenite rejection, zirconium shifts ferrite rejection to the lower-temperature bainite range. This behavior was shown to govern distortion and cracking during quenching.

Mr. Crafts explained the relationship between boron and deoxidizers. By stabilization of nitrogen with a deoxidizer, boron is not tied up with nitrogen and is free to retard austenite transformation. Because its nitride is insoluble at very high temperatures, titanium is an essential component for practical boron treatment of steel.

Discussing the effect of deoxidizers on mechanical properties, Mr. Crafts showed that low-temperature toughness may be greatly modified by grain-refining deoxidizers. Nitrogen tied up by deoxidizers is beneficial, but none of the common treatments are sufficiently effective to produce the degree of toughness associated with normalized fine-grained steels in as-rolled plate. The need for such a grain-refining treatment in the production of ship plate and other structural steels is pressing.

Strain-aging (due primarily to precipitation of iron nitride) is suppressed by all of the nitride-forming deoxidizers, aluminum, zirconium, titanium and vanadium. Vanadium is of particular interest because it permits the steel to be rimmed so that a high surface quality is maintained.

Creep strength of steel is controlled by reactions that are closely analogous to those affecting austenite transformation. Aluminum materially reduces the creep-inhibiting effect of nitrogen, whereas zirconium increases creep strength when the nitrogen content is high.

The improvement in creep by zirconium, titanium and vanadium may in part be due to the cubic structure of their nitrides. The tremendous effect of boron on creep strength, like its effect on hardenability, has yet to be explained satisfactorily.—**Reported by Lewis H. Gross for the Baltimore Chapter.**

IMPORTANT MEETINGS

for May

Apr. 30-May 1—American Institute of Mining and Metallurgical Engineers. 8th Annual New England Regional Meeting of Institute of Metals Division, Hotel Bond, Hartford, Conn. (Ernest Kirkendall, Secretary, Metals Division, A.I.M.E., 29 West 39th St., New York 18, N. Y.)

May 2-6—Electrochemical Society, Inc. Spring Meeting, LaSalle Hotel, Chicago, Ill. (H. B. Linford, Secretary, E.S., 235 W. 102 St., New York 25, N. Y.)

May 2-7—Scientific Apparatus Makers Association. Annual Meeting, The Broadmoor, Colorado Springs, Colo. (Kenneth Andersen, Executive Vice-President, S.A.M.A., 20 North Wacker Drive, Room 3120, Chicago 6, Ill.)

May 3-6—Air Pollution Control Association. 47th Annual Meeting, Chattanooga, Tenn. (Harry C. Ballman, Executive Secretary, A.P.C.A., 4400 Fifth Ave., Pittsburgh 13, Pa.)

May 3-14—British Industries Fair. London and Birmingham, England. (New York Offices, 30 Rockefeller Plaza, New York 20, N. Y.)

May 4-7—American Welding Society. National Spring Technical Meeting and Welding and Allied Industry Exposition, Statler Hotel, Buffalo, N. Y. (J. G. Magrath, National Secretary, A.W.S., 33 West 39th St., New York 18, N. Y.)

May 5-7—American Institute of Electrical Engineers. North Eastern District Meeting, Schenectady, N. Y. (H. H. Henline, Secretary, 33 West 39th St., New York 18, N. Y.)

Recovery of Manganese From Openhearth Slags Is Topic at Calumet

Speaker: Shadburn Marshall
U. S. Steel Corp.

The Calumet Chapter heard Shadburn Marshall, Research and Development Laboratory, U. S. Steel Corp., discuss the "Recovery of Manganese From Openhearth Slags", at a recent meeting.

In late 1948 when Russia curtailed shipments of manganese ore to this country, the American Iron and Steel Institute conducted a survey among U. S. steelmakers and discovered that an estimated 772,000 tons of metallic manganese is contained annually in openhearth slags. This tonnage results solely from the smelting of current iron ores in blast furnaces. A subcommittee was appointed to investigate methods for recovering the manganese from this large potential source of a continuing domestic supply of manganese. Three different processes are now being evaluated: The pyrometallurgical process; the ammonium carbonate leaching process; and manganese recovery by chloridization.

Dr. Marshall explained that the pyrometallurgical process is a two-step method involving first the smelting of openhearth slag, which can be done in a blast furnace, with the resultant metal containing 15 to 23% manganese. The second step of the process is the selective oxidation of the spiegel to separate phosphorus and manganese. This has been successfully done in a two-stage or cyclic process in a surface-blown converter. The resultant product meets the manganese and phosphorus requirements for high-grade ore.

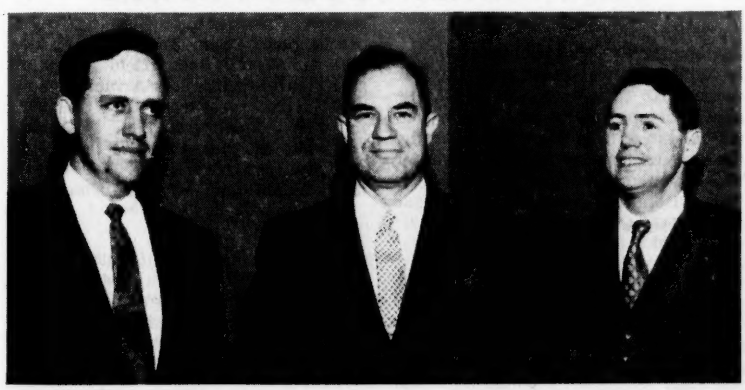
The second process described by Dr. Marshall is a chemical process involving leaching with ammonium chloride openhearth slags pretreated by clinkering with lime. Slag is clinkered with lime or limestone at a temperature of about 2300°F. and the product subjected to a reducing roast at about 1300°F. to convert the manganiferous material to MnO. The roast product can be ground, leached with ammonium carbonate solutions, and the manganese recovered as manganese carbonate by the eliminat'on of ammonia.

The third process discussed utilizes both pyrometallurgical and chemical techniques. It consists of treating slags with either solid or gaseous chlorides at a temperature that will volatilize the iron and manganese chlorides which may be condensed on a cold surface or dissolved in water to produce a very pure manganese oxide and either a high-grade iron powder or iron oxide.—**Reported by K. R. Hine for Calumet.**

Young Fellows Hear Hardness Testing Talk

V. E. Lysaght, Wilson Mechanical Instrument Division, American Chain & Cable Co., Spoke on "Hardness and Its Measurement" at Chicago Chapter's Young Fellows' Night. He reviewed hardness testing, equipment and test samples, and discussed microhardness testing, which he pioneered. (A review of this talk appeared on p. 6, July Metals Review, *so will not be repeated.) Shown above are, from left: Otto Zmeskal, chairman; Fred Kisslinger, technical chairman; B. H. Allen, Engineering Societies Personnel Service; Mr. Lysaght; S. F. Sternasty, chairman, Illinois Tech Chapter A.S.M.; Paul Fee, Wilson Mechanical Instrument Division; and Michael Schneider, winner of an A.S.M. Foundation for Education and Research Scholarship. (Reported by J. A. Erickson for Chicago)*

Detroit Hears President Austin



James B. Austin (Center) A. S. M. National President, Spoke on "Magnification in Time in Metallurgical Operations" Recently in Detroit. With Dr. Austin are Chairman T. E. Olson and G. A. Timmins, technical chairman of the meeting. (Reported by J. M. Herbenar for the Detroit Chapter)

Powder Metallurgy Talk Heard by Wichita Members

Speaker: D. V. Martin
Amplex Div., Chrysler Corp.

The Wichita Chapter heard a discussion on "Powder Metallurgy" by D. V. Martin, vice-president of the Amplex Division, Chrysler Corp., at a meeting held recently. The speaker supplemented his address with a sound slide film which outlined briefly the early history of powder metals. Several hundred samples of powdered metal products were on display during the meeting.—**Reported by J. Ewert for Wichita.**

Salem-Brosius Expands

Salem-Brosius, Inc., Pittsburgh, has recently purchased the George J. Hagen Co. Both companies design, manufacture and sell furnaces and heat treating equipment but have sold their products to different groups of industries.

Dayton Hears Talk on Magnetic Materials

Shown at a Meeting in Dayton Are, From Left: G. R. Stockmeier; John Buchanan, Coffee Speaker; J. E. Goldman, Who Spoke on "Magnetics and Magnetic Materials"; and J. G. Gantner, Chairman of the Dayton Chapter

Speaker: J. E. Goldman

Carnegie Institute of Technology

J. E. Goldman, director, laboratory for magnetics research, Carnegie Institute of Technology, spoke to the Dayton Chapter recently on "Magnetic Materials".

Some of the newer aspects of magnetic phenomena, with emphasis on the "whys" rather than the "hows", which pertain more to the producers of the materials, were discussed. Magnetism is not a new phenomenon. We know that the ancient Phoenicians used magnets in much the same way that navigators use the compass today. Developments in magnetics have been arrived at through painstaking physical research.

Discussing such things as the differences between ferrimagnetism, ferromagnetism, and antiferromagnetism, Dr. Goldman did an excellent job of explaining some of the basic concepts related to the theory of magnetism. When considering whether a material is paramagnetic or diamagnetic, or whether it has a strengthening or diminishing magnetic effect, there are always a few exceptions to the rule to help confuse the definitions. For instance, zinc crystals change between being paramagnetic and diamagnetic as a function of temperature. About 80% of the materials in nature are diamagnetic. Another example of changing magnetic properties occurs in the well-known 18-8 stainless steel. This alloy is normally nonmagnetic until work hardening or lowering the temperature causes some of the austenite to transform to ferrite. The term ferromagnetic is applied to materials which show a large or significant strengthening magnetic effect. An example of this would be iron.

Going along with the theory of magnetism as developed by noteworthy French physicists such as Professors Langevin, Weiss and Neel, a magnetic moment occurs when a magnetic field induces an opposed force in the form of small current loops, which are the electron orbits in the theory of atomic structure. In a paramagnetic situation there would be no relation between the magnetic moment of one atom with another, whereas in a ferromagnetic situation there is a cumulative interaction with each other. Thermal activity will cause sufficient agitation to disrupt such interaction.

In the case of ferrites, as for example Fe_3O_4, the material has a different temperature dependency. The label "ferrimagnetic," is applied because the magnetic properties are due to an interaction between neighbors which favors antiparallel alignment of the neighboring magnets rather than parallel alignment as in ferromagnets.

Applications of powdered, permanent magnets and experimental work on ultra-high magnetostriction were discussed. One example of this ultra-high magnetostriction is found in 25% Co-Fe crystals.—**Reported by D. C. Heckard for Dayton.**

Buffalo Dinner-Dance Draws Record Attendance

More than 150 couples turned out at the Buffalo Trap and Field Club for the Buffalo Chapter's annual dinner-dance, which has become such a popular affair that it had to be moved to larger quarters this year in order to accommodate all of the members and guests who wished to attend. Cocktails were provided by dance sponsors and a midnight buffet dinner climaxed a notable social event—**Reported by A. E. Leach for the Buffalo Chapter.**

Montana Given Grant

The award of a grant of $13,000 to the Montana School of Mines for a program of research in surface chemistry was recently made by the National Science Foundation. The award is assigned to the departments of mineral dressing and chemistry to enable faculty and graduate students to continue work previously commenced in the field of flotation.

THIRTY YEARS AGO

An Eastern Sectional Meeting of the American Society for Steel Treating (predecessor of the A.S.M.) was held in the summer of 1923, at Bethlehem, Pa. The meeting was opened by A. P. SPOONER, Chairman of the Lehigh Valley Chapter, then metallurgical engineer and now engineer of tests for Bethlehem Steel Co. JOHN J. CROWE, then metallurgist of Philadelphia Navy Yard (now vice-president, Air Reduction Co.) was chairman of the meeting.

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An editorial in the June 1923 issue of *Transactions* singled out the Philadelphia and Hartford Chapters for commendation on their membership drives—Philadelphia recording an 80% increase in a year. A large part of the credit for this phenomenal growth was given to NORMAN C. EINWECHTER, a member of the Philadelphia Chapter's membership committee, and then with the firm of Einwechter and Wyeth (now assistant to vice-president, Carpenter Steel Co.).

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Chapter chairmen elected to serve for the 1923-24 season included FRANK G. WHEELER, Chicago Chapter, then engineer of standards for Miehle Printing Press & Mfg. Co., now retired; J. M. WATSON, Detroit Chapter, then with Hupp Motor Co. (now retired and an A.S.M. past national president); J. J. CURRAN, Hartford Chapter, then with Henry Southern Engineering Co., now chief metallurgist, Walworth Co., Greensburg, Pa.; H. B. NORTHRUP, Indianapolis Chapter, then metallurgist with Diamond Chain & Mfg. Co. (since then long-time director of mineral industries extension at Pennsylvania State College, and now retired); SAM TOUR, New York, then metallurgist, Doehler Die Casting Co. (now chairman of the board, Sam Tour & Co.); EDSON L. WOOD, Springfield Chapter, then with Springfield Armory (now director of research for the Armory); JEROME STRAUSS, Washington Chapter, then with the U. S. Naval Gun Factory (now vice-president, Vanadium Corp. of America).

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A. S. S. T. membership buttons were advertised in 1923 at a cost of $1.00. (Still available, redesigned for A.S.M. monogram and priced at $1.50 for rolled gold and $3.50 for 14-K. gold. —Adv.)

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Automatic pocket pencils with A. S. S. T. monograms were also advertised (no longer available; now classed as antiques).

Outlines Properties Of Metals at High Temperatures

Speaker: George V. Smith
U. S. Steel Corp.

"The Properties of Metals at Elevated Temperatures" was the topic of a talk given by George V. Smith, metallurgist in the Research Laboratory of the United States Steel Corp., at a meeting of the Eastern New York Chapter.

Dr. Smith pointed out the importance of a knowledge of the high-temperature properties of metals in choosing a metal and working stress for elevated temperature applications. While stresses for normal atmospheric temperature applications may be picked below the elastic limit from a stress-strain diagram, stresses for elevated temperature use should be picked on the basis of strain rate. A lower strain rate results in a lower peak stress. Furthermore, as the strain rate is decreased, the resulting fracture changes from ductile to brittle and from transgranular to grain boundary fracture. Early designers thought that the high-temperature tensile test could be used as a basis for design stress. It was not until later that the significance of creep was realized. In designing for high-temperature service a specific amount of creep must be allowed for over the expected life of the component, not zero creep, as this is impractical.

Dr. Smith stated that it is not possible to substitute rupture data for creep data inasmuch as both kinds of data are necessary for intelligent design. This is primarily because rupture data tell us little about the behavior throughout the three stages of creep. If abnormal creep occurs, where the creep rate is low in the initial stage and increases in the second stage, considerably more creep would occur in a part in service than would be expected from the results of a rupture test.

Abnormal creep behavior may be attributed to microstructural changes in the alloy at elevated temperatures. For instance, carbides may precipitate or migrate to the grain boundaries. In 18-8 stainless steel chi and sigma phases have been found.

The ever present problem with creep is to extrapolate the short-time creep at any particular time. However, this does not tell when tertiary creep will start and therefore may lead to errors. The relation between rupture time or time to the beginning of tertiary creep and stress can be determined for relatively short times and high stresses. When these values are plotted on a log-log scale a straight line is obtained which can be extrapolated to longer times and lower stresses. From this sort of plot a more reliable creep life may be determined for a given stress and temperature.

In summarizing, Dr. Smith pointed out that an economical design would be based on a limited life allowing for a definite amount of deformation, not an unlimited life with no deformation.

The transformation of laboratory creep and rupture data to useful design data is at best a very complicated process.—**Reported by John M. Gerken for the Eastern New York Chapter.**

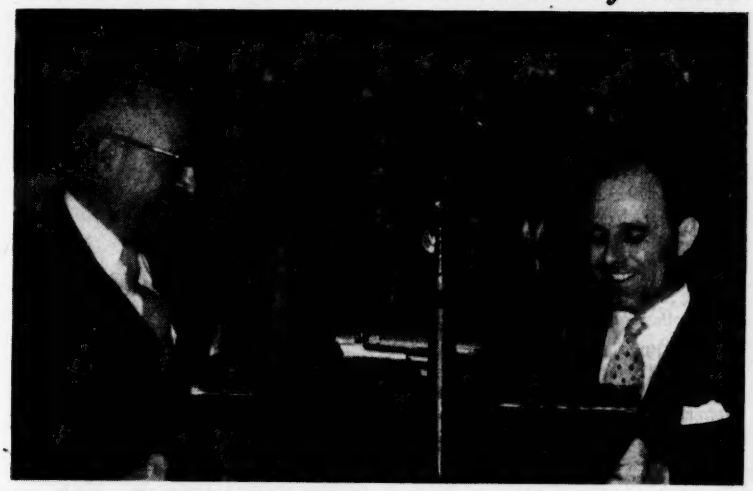
Boston College Course

Boston College has announced a special two-weeks intensive course in "Modern Industrial Spectroscopy" to be given at Chestnut Hill, Boston, from July 12 to July 23.

The course is particularly designed for chemists, physicists and other interested personnel from industries which are in the process of installing spectrographic equipment.

Information on the course can be obtained from Professor James J. Devlin, S.J., Physics Department, Boston College, Chestnut Hill 67, Boston, Mass.

Describes Dimensional Behavior of Steels



W. Hughes White (Left), Hoyland Steel Co., Chairman of the New Jersey Chapter, Introduces Speaker B. L. Averbach, Massachusetts Institute of Technology, Who Discussed "Dimensional Behavior of Heat Treated Steels"

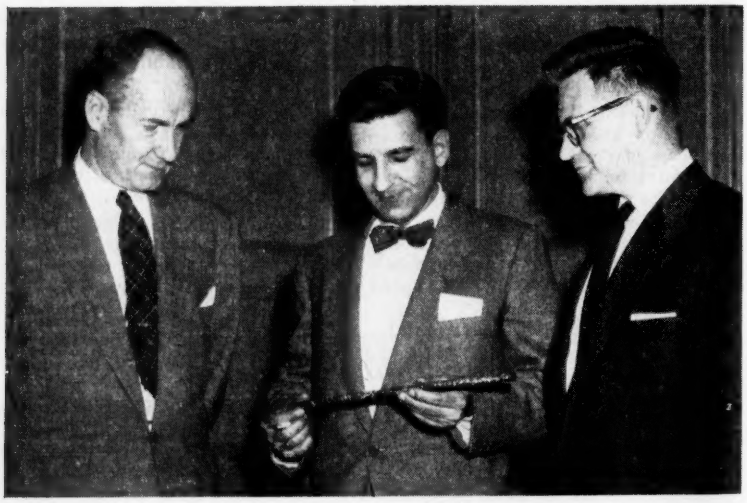
Speaker: B. L. Averbach
Massachusetts Institute of Technology

"Dimensional Behavior of Heat Treated Steels" was the topic selected by B. L. Averbach for his talk before the New Jersey Chapter. Using slides to make his points clear he explained why very accurately machined parts such as gages, dies and lead screws may change in dimensions after they are manufactured.

The speaker pointed out that unhardened parts made of such metals as austenitic stainless steel or Invar may contain residual stress arising from cold working, rough machining or quenching during the so-called annealing treatment. Residual stresses are responsibile for dimensional changes when surface metal is removed by machining or grinding; dropping or jarring such a part may also cause a dimensional change of appreciable magnitude.

He explained further that in hardened gages or dies, dimensional instability is more involved and difficult to control. Here it is caused principally by the volume change accompanying phase transformation, which is rarely if ever completed immediately after the quench but continues on aging at room temperature or on tempering. A so-called nondeforming steel is one which in the hardened condition has a balance between tempered martensite and retained austenite such that over-all volume is nearly identical to that of its ferrite-carbide structure before hardening. In a hardened part, transformation of retained austenite on aging at room temperature or on tempering causes an expansion; on the other hand, tempering martensite results in contraction. Refrigeration may minimize expansion due to retained austenite but tends to increase contraction due to tempering martensite. Because the necessity for high hardness prevents a condition of phase equilibrium, dimensional changes inevitably occur with time. Under the best of circumstances such changes are extremely small, but improper heat treatment may result in serious dimensional instability. Thus, the manufacture of very hard steel parts which will "stay put" constitutes one of the metallurgist's greatest problems.—**Reported by Raymond A. Grange for New Jersey.**

Presents Atomic Problems at Rochester



Viewing a Piece of Zirconium, a Structural Element in Nuclear Thermal Reactors, Are John H. Rogers (Left), Eastman Kodak Co., J. E. Burke (Center), Knolls Atomic Power Laboratory, Who Spoke on "Metallurgical Problems in the Use of Atomic Energy", and R. S. Guinan, Chapter Chairman, After a Meeting of the Rochester Chapter. (Photo by B. N. Iannone)

Speaker: J. E. Burke

Knolls Atomic Power Laboratory

"Metallurgical Problems in the Use of Atomic Energy" was the subject discussed by J. E. Burke of General Electric's Knolls Atomic Power Laboratory at a meeting in Rochester. Government security regulations prevented the speaker from removing most of the mystery of the subject, but, nevertheless, the material presented did afford an interesting, challenging and versatile program for the metallurgist.

Dr. Burke's talk consisted of an introduction to nuclear energy relations and a description of the types and general construction of nuclear reactors, followed by more detailed considerations of the general problems confronting the metallurgist and a description of some of the work that has been done at Knolls Atomic Power Laboratory in solving some of these problems.

There are two products of importance in a nuclear reactor, heat and neutrons. Besides the usual problems of strength, formability, thermal conductivity, resistance to corrosion and erosion at normal and high temperatures, the metallurgist is further confronted with providing materials of various neutron-aborption characteristics.

Fuel elements are the heart of the reactor. They must contain a fissionable material and may also contain a fertile material. They must withstand high temperatures, be corrosion resistant, strong to withstand high thermal stress, must not deteriorate too rapidly as they are burned up, and finally, for regeneration purposes, should be readily soluble and subject to simple chemical processing.

Metals have been produced with new properties, as, for example, vanadium in the ductile form.

The development of liquid sodium technology was described by Dr. Burke, along with a description of corrosion test methods. With pure sodium at 500° C., types 302, 304, 316, 321 and 347 showed no attack after one year. With sodium saturated with oxygen, the rate of attack is markedly increased.

Dr. Burke stated that uranium exists in three allotropic forms, alpha, beta and gamma phases. To determine the structure of beta uranium, it was found expedient to resort to the single crystal technique. A method of preparation was developed utilizing the gamma phase. Crystal structures determined showed the beta phase very similar in structure to that of the sigma phase (brittle constituent) of stainless steel.

Zirconium, having low-neutron absorption characteristics, is a chief structural element for use in thermal reactors.

This meeting was under the joint sponsorship of the Rochester Chapter of the American Society for Metals, the American Electroplating Society, the American Foundrymen's Association, the American Welding Society and the Industrial Management Council.

A lively question and answer period after the lecture brought out other pertinent facts about atomic problems.—**Reported by Sydney Gamlen for the Rochester Chapter.**

Obituaries

Lewis William Mesta

Lewis William Mesta, noted Pittsburgh industrialist and executive vice-president of Mesta Machine Co., died suddenly in December. Mr. Mesta had been associated for 45 years with the Pittsburgh firm founded by his uncle, George Mesta, in 1898. He was a graduate mechanical engineer from Western University of Pennsylvania (now University of Pittsburgh) in 1911. He was a member of the American Iron and Steel Institute and the Iron and Steel Engineers as well as American Society for Metals.

Kotaro Honda

Kotaro Honda, internationally known metallurgist and an Honorary Member of the American Society for Metals, died recently in Tokyo at the age of 83.

In 1916 Dr. Honda developed the famous "K.S." steel which has been used throughout the world in ignition magnetos of automobiles, airplanes, radios and ships' compasses. In 1933 he developed nonrusting invar steel which has a low expansion with heat changes. Dr. Honda was the first recipient of the Cultural Order of the Rising Sun, an award set up in 1937 as a sort of Japanese Nobel Prize.

Harold Vance White

Harold Vance White, professor of metallurgy and head of the department of metallurgical engineering, Virginia Polytechnic Institute, passed away in January after a brief illness.

Professor White's numerous research efforts brought him distinction in his profession, but he derived his greatest satisfaction from his association with his students in and out of the classroom and from the achievements of the graduates of his department. He believed that any engineering teacher must keep in touch with the problems and progress of the industries in his field, and under his guidance the department of metallurgical engineering at Tech has enjoyed a healthy and steady growth over the past years.

TO A.S.M. Members: Many of you are looking forward with pleasure to more details about the Technical Societies Congress in Europe from June 8-24, 1955. If you wish to be immediately informed on additional plans as they develop for the technical program and the planned visits, then send your name to A.S.M. headquarters and request to be placed on the mailing list to receive information about "A.S.M. to Europe in '55".

New Members and Sponsors Honored by Cleveland Chapter

Student Graduate Guests Who Were Honored by the Cleveland Chapter at a Recent Meeting Are Shown With Their Sponsors. From left, front: W. N. Rice, S. M. Campbell, Jr., E. G. Kay, R. J. Gridley, C. M. Scheuermann and M. L. Anderson, Jr. Sponsors in back row, from left, are: W. S. VanRensselaer, E. Dyble, J. P. Long, Jr., G. D. Dolch, E. J. Ripling, H. Robinson, S. M. Grant and N. S. Carlson. (Photo by Ty Cobb)

Speaker: D. S. Billington

Oak Ridge National Laboratory

The Cleveland Chapter heard D. S. Billington, Oak Ridge National Laboratory, speak on "Nuclear Irradiation Effects in Metals" at a recent meeting. Dr. Billington showed lantern slides of the laboratory in which many types of metallurgical tests are performed on metals that have been subjected to radiation. Tensile tests, sample polishing and etching, hardness tests and photography in the laboratory are all accomplished by remote control methods.

Dr. Billington described the basic principles of neutron bombardment and its effect on metals. He briefly discussed the several processes that take place when a fission neutron penetrates into a piece of copper. The energy of the neutron is spent in bombarding the copper atoms, causing them to change their position and in some cases to become zinc atoms.

It has been found that copper in particular increases in hardness and critical shear strength with increasing amounts of exposure to radiation. These changes are stable even after radioactivity of the copper has disappeared.

Radiation tests performed on an age hardenable copper beryllium alloy were also discussed. The effects of bombarding this alloy appeared to be the same as raising the aging temperature. That is, maximum hardness is reached in a shorter period of time.

The speaker explained that quartz, when exposed to neutron irradiation, decreases in density. X-rays have verified these results.

The Cleveland Chapter invited seven young men, recent transfers from student to regular member status, to the meeting as guests. Each one was sponsored by a member of the local chapter and was introduced by Chairman John Kiefer at the beginning of the meeting.

Student Scholarship Awards and plaques were given by the A.S.M. Foundation for Education and Research to Robert E. Goodenow and Edwin M. Herman, students at Case Institute of Technology and Fenn College, respectively, during the meeting.—**Reported by R. M. Baker for the Cleveland Chapter.**

Student Scholarship Awards and Plaques Given by the A. S. M. Foundation for Education and Research Are Presented by John Kiefer, Chairman of the Cleveland Chapter, to Robert E. Goodenow, Case Institute of Technology, and Edwin M. Herman, Fenn College. (Photograph by Ty Cobb)

Europe—June 1955

THE Joint Metallurgical Societies Meeting, to be held in Europe in June 1955, will have the following objectives:

1. To establish personal contact between experts in the different branches of metallurgy in the U.S.A. and Europe.

2. To provide opportunities for scientific and technical discussion including the possible presentation of papers, discussion and study groups and informal talks; to enable visitors to see something of the metallurgical industries of Europe and visit places of historical and other interest; and to provide opportunities to see something of the European way of life.

3. To foster better understanding and cooperation among all concerned.

DATES

The dates of the meeting have been changed by one week. The opening session will be held in London on June 8, 1955, rather than on June 1 as originally planned. The date schedule, subject to slight change, is now as follows:

June 8-14—United Kingdom
June 15 —Traveling to Germany
June 16-20—Dusseldorf
June 20-21—Traveling to Paris
June 21-24—Paris

The meeting will close on June 24 or 25, 1955.

CONFERENCE SUBJECTS

Tentative topics to be presented during the meeting include: Ironmaking and raw materials (including coke and ore); steelmaking; melting, refining, fabrication and heat treatment of nonferrous light metals; melting, refining, fabrication and heat treatment of other nonferrous metals; ferrous fabrication; surface treatment, including coating and finishing; steel properties involving control and heat treatment; and education and research.

It is doubtful that there will be a general call for technical contributions to the main divisions of the conference. Conference days will probably be allocated to general meeting, discussion of subject divisions, plant visits, and intimate contact and discussion between American and European conferees with common interests.

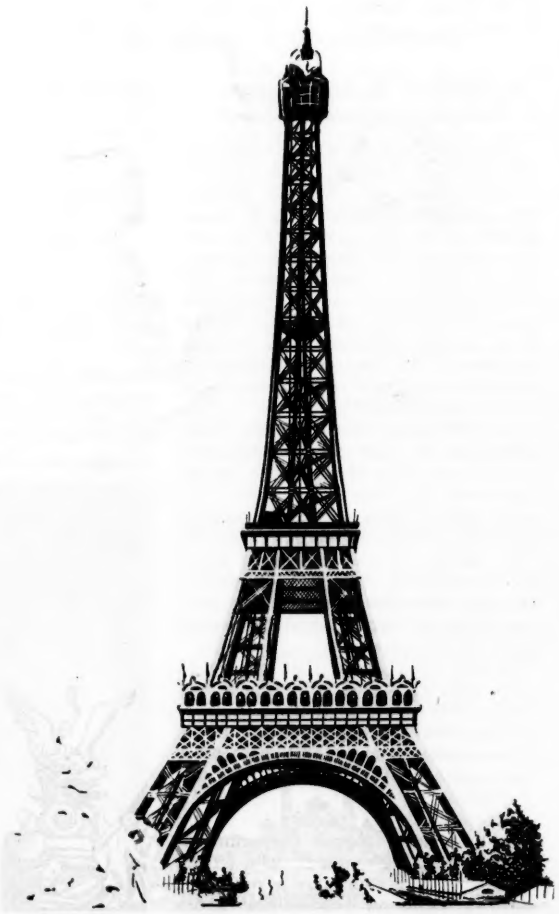
COSTS AND TRAVEL ARRANGEMENTS

Beginning in London on June 8, 1955, the first day of the conference, until its close in Paris on June 24 or 25, 1955, American conferees and their families will travel in a body as an all-expense package tour. Itineraries for time spent in each of the countries to be visited are being arranged. A safe estimate of the cost of the trip will be approximately $25-30 per day per person for the time in Europe. This would include transportation, hotels and meals, but not personal items such as laundry, etc.

Thos. Cook & Son Ltd. have been appointed travel agents and managers in Europe for the Meeting. A definite quotation is expected from Cook on the cost of the all-expense tour from London through Paris, not later than July 1, 1954, and this will be passed on to members as soon as it has been received.

The trip from America to Europe and return will be an individually arranged project. Thos. Cook & Son Ltd. will hold 350 reservations on various types of transportation for A.S.M. members who care to contact them to make arrangements. There is, however, no obligation to make these arrangements through Cook; you are quite free to see your own travel agent.

Travel bureaus in the United Kingdom, Germany and France have been requested to send travel literature to members who have had their names placed on the "A.S.M. to Europe" list. (See box on p. 14).



Discusses Nonintegrated Steel Industry at Calumet

F. M. Gillies, President of Acme Steel Co., Discussed the "Nonintegrated Steel Industry" at a Meeting in Calumet. Shown are, from left: T. A. Foss, program chairman; Mr. Gillies; W. A. Blake, technical chairman; W. W. Hintalla, Chapter chairman; P. H. Booth, secretary; and J. R. Bateman, past chairman

Speaker: F. M. Gillies
Acme Steel Co.

F. M. Gillies, president of Acme Steel Co., discussed his observations on "The Nonintegrated Steel Industry" at a meeting in Calumet.

Mr. Gillies pointed out the differences between integrated, semi-integrated and nonintegrated steel producers. An integrated steel plant was described as one that goes all the way back to basic raw materials and the means of recovering them. A semi-integrated producer is one who starts with steelmaking and has the necessary rolling facilities. A nonintegrated producer is one who buys his raw materials in semifinished form such as billets, slabs, hot rolled sheets, or, in the case of rail re-rollers, scrap rails and axles. Finally there is the warehouse which buys finished rolled products and operates as a service rather than processor.

The nonintegrated producer must have, first of all, a dependable source of supply which is usually a fully integrated company or a semi-integrated producer. Assuming that the prime producer prices his semifinished product sufficiently high to permit a profit, the nonintegrated producer starts with raw material that is higher in cost than would be the semifinished cost in the further processing in the integrated mill. With comparable rolling and finishing equipment it is possible for the nonintegrated producer to match the costs of the integrated plant from this point on. Recent expansion among the large integrated producers has been in the development of high-production single-purpose mills which permit the very lowest of rolling costs. The nonintegrated plant must depend on greater rolling flexibility to permit rolling smaller quantities with more frequent changes, with associated increases in operating costs. However, if the product price is sufficient to pay the higher cost of the raw material and provide a profit on the invested capital, the nonintegrated producer can live.

Balancing the disadvantages of raw material prices that bear on profit, the nonintegrated plants do not have to carry the load of fixed charges of mines and the heavy capital investment of primary processing equipment, which is particularly heavy when idled. The nonintegrated company can react more quickly to market conditions and face less expense in overtaking inertia. Management decisions are accelerated and mistakes more promptly corrected because of the shorter chain of command. Smallness, however, doesn't eliminate headaches—they are only different in nature. No matter what a company's degree of integration may be, there will always remain a complete interdependence in this great industry.—**Reported by K. R. Hine for the Calumet Chapter.**

Austin Guest of Dayton Chapter

National Officers Night at the Dayton Chapter Honored James B. Austin, A. S. M. President, Who Spoke on "Magnification in Time in Metallurgical Operations". Shown discussing the program are, from left: I. H. Schaible, vice-chairman; C. L. Gillum, secretary; Dr. Austin; and J. G. Gantner, chairman. Dr. Austin also presented a brief report of A. S. M. activities, Metal Show highlights, past and future, and news of the forthcoming World Metallurgical Congress to be held in Europe in 1955. (Reported by D. C. Heckard for the Dayton Chapter)

Plan Spectroscopy Meeting

The fifth International Symposium on Spectroscopy will be held at Gmunden, Salzkammergut, Austria, from Aug. 30 through Sept 3, 1954.

The meeting will be subdivided into sessions on absorption and emission spectroscopy. In addition to the lectures, evenings will be arranged for free group discussions. Papers will be accepted until May 30, 1954. Further information may be obtained by writing: Verein Osterreichischer Chemiker Arbeitsgruppen fur Spektrochemie und Kolorimetrie, Vienna, Austria.

Compliments

To A. O. SCHAEFER, vice-president of the Midvale Co., on being named Delaware Valley Metals Man of the Year by the Philadelphia Chapter. This was the first presentation of an annual award for metallurgical accomplishments to be made by the Chapter.

♦ ♦ ♦

To E. H. DIX, JR., on receiving the 1954 National Association of Corrosion Engineers' Frank Newman Speller Award in recognition of his achievements in corrosion engineering. Mr. Dix is assistant director of research of aluminum research laboratories of the Aluminum Co. of America.

♦ ♦ ♦

To LESLIE S. FLETCHER on his appointment to the position of research fund director, American Society of Tool Engineers. Colonel Fletcher is a West Point graduate and also attended Rhode Island State College and Massachusetts Institute of Technology. He holds three World War II decorations for administrative work, and took part in the Salerno and Normandy landings. He is a past chairman of the New York Chapter A.S.M. and presently a member of the New York Chapter's executive committee. Prior to joining the A.S.T.E. as research fund director, Colonel Fletcher was technical director and president of Sam Tour & Co., Inc.

Aborn Gives Talk On Ferrous Welding At Minnesota Meeting

Speaker: Robert H. Aborn
U. S. Steel Corp.

The Minnesota Chapter heard Robert H. Aborn, assistant director of research, United States Steel Corp., speak on the "Metallurgy of Ferrous Welding" recently. A most unusual moving picture of the arc under various electrodes at 3000-frames a minute gave an insight into the transfer of weld metal and the activity of the arc and its shield.

Hydrogen from the arc shield generated by the welding rod coating and dissolved in the molten arc metal and pool can be a major cause of weld defects. The speaker traced various types of weld imperfection to the disrupting pressure of hydrogen thrown out of solution as the weld metal cools. An offsetting method is to cool the weld slowly enough to avoid the brittle martensitic stage by preheating when the alloy and carbon content requires.

High alloy may lead to grain boundary segregation and sigma phase embrittlement. Thermal stresses are offset by cooling slowly enough to avoid the brittle martensitic state, also accomplished by preheat. Spot welds cool fastest and gas welds the slowest, with arc welds generally intermediate. Welds on thin metal obviously cool slower than welds on thick sections.

Low-hydrogen alloy electrodes have raised weld strengths to the 120,000 psi. range, the speaker said. and future improvements will reach the 200,000 psi. range. Automatic submerged arc-welding rates of 300 in. a minute are already possible. Automatic heat treatment of spot welds has doubled tensile strength and increased impact strength 12 times. Low-temperature welding of aluminum, copper and steel is coming over from Europe and depends mainly upon cleaning and pressure. Argon and helium, except for current government restrictions on the latter, are in increasing use for arc shielding. Killed steel plate is tending to replace other types for pressure vessels and highly stressed ship structures in which the thickness equals or exceeds 1 in.—**Reported by Knox A. Powell for Minnesota.**

Worcester Offers Series On Process Metallurgy

The Worcester Chapter is again sponsoring a series of illustrated educational lectures in recognition of the past success and popularity of these programs.

The course, "Practical Process Metallurgy", has been designed especially for the "man in the shop". The lectures are being held in the Alden Memorial Auditorium each Monday evening from Mar. 22 through Apr. 12. The speakers and subjects to be discussed are as follows:

"Mining, Melting and Refining of Iron, Aluminum and Copper," by Joseph C. Danec, technical assistant to the production engineer, Norton Behr-Manning Overseas, Inc.

"Heat Treating Operations on Steel", by Harold J. Elmendorf, chief spring engineer, American Steel and Wire Co.

A panel discussion on production processes—"Machining With Single-Point Tools," by W. P. Coomey, general manager, Rice Barton, Co.; "Metal Finishing", by Bruce E. Warner, president, New England Plating Co., Inc.; and "Grinding Methods", by Gordon T. Rideout, abrasive engineer, Norton Co.

. "Mechanical Testing of Metals," by Francis G. Tatnall, manager, testing machine department, Baldwin-Lima-Hamilton Corp.

Last year over 1200 people representing 110 Worcester County industries attended the Program.

A.I.M.E. Conference

The Pacific Northwest Metals and Minerals Conference, a three-day meeting sponsored by the American Institute of Mining and Metallurgical Engineers, will be held in Portland, Ore., from Apr. 29 through May 1. The conference will have sessions on minerals industries education, geology, groundwater, industrial minerals, and five full sessions devoted to metallurgy. A special luncheon will be held for metals men. W. A. Pearl, the new director of the Bonneville Power Administration, will be guest speaker at the luncheon.

Relates Atomic Energy Work to Metallurgy

John Convey, Director of Mines Branch, Department of Mines and Technical Surveys, Ottawa, Spoke Before the Ontario Chapter on "Association of Metallurgy With the Atomic Energy Project". Shown above are, from left: Benton Dixon, chairman; Mr. Convey; and M. N. Tallman, vice-chairman of the Ontario Chapter. (Reported by H. M. Braid for Ontario)

Metal Progress Editor on New Metals

E. E. Thum, Editor of Metal Progress, *Discussed "New Metals" at the Sustaining Members Night Meeting in Pittsburgh Recently. Shown are, from left: G. H. Enzian, Chapter chairman; Mr. Thum; H. A. Simon, coffee speaker, who talked on "Little-Known Facts Concerning Human Behavior and Nature"; and Porter R. Wray, vice-chairman of the Chapter*

Speaker: E. E. Thum
Editor, Metal Progress

E. E. Thum, editor of *Metal Progress*, presented a discussion on "New Metals" at Sustaining Members' Night meeting in Pittsburgh.

Prior to the main topic, Mr. Thum described some highlights of a recent trip to Europe, citing different examples and instances where the foreign producer of metals was operating under handicaps when compared to his American counterpart. These handicaps were a result of inferior coke, low-grade iron ore and economic ills. Despite these troubles, Mr. Thum added, the foreign producer was producing a product which very often compared favorably with the quality of similar items produced in America, and at surprisingly high rates of production. This success, to a great degree, has been the result of modifications of existing practices to meet a specific need.

For his main topic, Mr. Thum discussed the uses of some of the "newer" metals in their alloy and elemental forms. He also emphasized difficulties in the methods of producing these highly reactive metals from their ores, in any considerable degree of purity and the unique methods required for these operations. These difficulties and the resulting high cost of production have been responsible for their relative newness and small usage. Demand for certain characteristics peculiar to these metals has changed the picture in recent years, and according to Mr. Thum, this trend should be accelerated in the future.

Elements familiar only as ferroalloys a few years ago, and which are now being used either as a pure metal or an alloy, include chromium, molybdenum and manganese. Other metals described in a general way were magnesium and titanium (interesting to the aircraft industry), sodium, beryllium and zirconium (interesting for their use in atomic reactors) and ultra-pure germanium and silicon (interesting to the electronics industry).—**Reported by R. J. Reitz for the Pittsburgh Chapter.**

Economics Is Subject at Worcester

Leaders at a Meeting of the Worcester Chapter Held Recently Included, From Left: Joseph P. Danec, Norton Behr-Manning Overseas, Inc., Program Chairman; Walter B. Dennen, Director, Worcester Boys Trade High School, Technical Chairman; Richard Preston, Director of the Massachusetts Department of Commerce, Who Spoke on "Problems of Economic Development in Massachusetts"; and Lincoln G. Shaw, Pratt & Inman, Secretary-Treasurer. (Reported by C. Weston Russell for Worcester Chapter)

Powder Metallurgy Uses Given at York Meeting

Speaker: L. H. Mott
Stevens Institute of Technology

"Powder Metallurgy and Cemented Carbides" was the topic discussed by Lambert H. Mott, Stevens Institute of Technology, at a meeting of the York Chapter.

Mr. Mott traced powder metallurgy from its original application in incandescent lamp filaments, through the development of carbide cutting tools in Germany prior to World War II, to the growing list of present-day uses. He gave examples of each use and classified each according to the characteristic of the powder compact which made the application possible. The characteristics included the ability to produce high-melting point metals, superhard materials, combinations of unalloyable materials, machining reductions and controlled porosity and permeability.

In discussing the future of the powder metal industry, Mr. Mott described the role of Stevens Institute in previous developments and the research now in progress. He detailed the problems in perfecting a powder metal turbine blade, permitting operation at higher temperatures through controlled permeability.—**Reported by John A. Gulya for York Chapter.**

Birmingham Hears Talk On Toolsteel Applications

Speaker: L. V. Klaybor
Allegheny Ludlum Steel Corp.

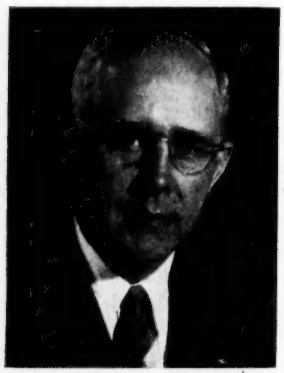
The Birmingham Chapter heard L. V. Klaybor, associate director of research, Tool and Die Steel Division, Allegheny Ludlum Steel Corp., speak on "Toolsteels" at a recent meeting. Mr. Klaybor discussed various analyses and applications of toolsteels.

The coffee speaker, R. A. Davis, district engineer for Chicago Bridge and Iron Co., gave a talk on the fabrication and erection of the spherical tank built for General Electric Co. to house special testing equipment—**Reported by Walton P. McCord for Birmingham.**

Mowry E. Goetz to Receive McFarland Award

The Penn State Chapter has announced the selection of Mowry E. Goetz as the 1954 recipient of the David Ford McFarland Award. Mr. Goetz, manager of operations, Cleveland District, Republic Steel Corp., will receive the award at a dinner meeting Apr. 30 at State College, Pa. After the dinner he will deliver a technical address on the background of the building of a specialized steel plant.

The McFarland Award was established in 1949 as an annual recognition to a metallurgy alumnus of the University. Mr. Goetz entered Penn State in 1912, served as vice-president of his class in 1916, returned a year to the openhearth at the Aliquippa Works of Jones & Laughlin where he had worked prior to entering college, and received his B.S. degree in metallurgy in 1917.



M. E. Goetz

During World War I, Mr. Goetz served in the Army as an instructor and overseas as intelligence officer, operations officer and adjutant of the regiment. He was awarded the D.S.C., the Silver Star and the French Croix de Guerre. He returned to Jones & Laughlin and became senior melter, then superintendent of the blooming mill, bar and billet mills, and assistant superintendent of the steel works at Aliquippa. He joined Republic Steel Corp. in 1940, and served as assistant manager of operations in Chicago, and was later employed in various executive operating capacities in the Cleveland district.

Friends of Mr. Goetz and the Chapter are invited to make reservations for the dinner meeting with H. M. Davis, Division of Metallurgy, College of Mineral Industries, Pennsylvania State University, State College, Pa.

New Topics for Old Timers in Los Angeles

Speaker: Glenn A. Fritzlen

Haynes Stellite Co.

Old Timers' Night for the Los Angeles Chapter was highlighted by the presence of National Secretary "Bill" Eisenman and his reminiscences of the first World Metallurgical Congress. The Chapter honored Roy E. Paine of Aluminum Co. of America and Don Dawkins of General Petroleum Co. by presenting them with 25-year silver certificates.

Glenn Fritzlen, assistant technical director, Haynes Stellite Co., spoke on the "Development and Application of Special Alloys" to corrosion, abrasion and high-temperature services. Of particular interest was the utilization of hard facing alloys for the protection of low alloy steels subject to corrosive and abrasive environments. — **Reported by R. F. Kostoch for the Los Angeles Chapter.**

G. L. Fritzlen

New York Enjoys Cermet Discussion

Speaker: John T. Norton

Massachusetts Institute of Technology

Despite an unusually severe snow storm which practically crippled transportation in New York City, a large audience was on hand to hear John T. Norton of Massachusetts Institute of Technology talk on "Cermets" in New York recently.

Professor Norton stated that the development of cermets has taken place at a tremendous pace and that their future looks optimistic. Recent developments have, of course, been accelerated due to the need for materials for high-temperature service in jet engines.

Pointing out that it would be impossible to cover the entire field of cermets in the time allotted, Professor Norton singled out for his talk the TiC-base cermets. He stated that the structure of TiC is unique in that the carbon atoms can readily be replaced by oxygen, nitrogen or holes, while the titanium atoms can similarly be replaced by molybdenum or tungsten. This flexibility of the TiC structure makes it an interesting and important material. Professor Norton also pointed out how the niobium carbide, tantalum carbide, titanium carbide solid solution is more oxidation resistant than straight titanium carbide.

The speaker then briefly discussed the role of the binder phase. Since the binder surrounds the refractory grains in the cermet in the form of a thin film, the behavior of the binder is materially different from that which can be expected of the same element in bulk. This highly important point has not been fully realized as yet by those working in the field of cermets.

The method of manufacture of titanium carbide-base cermets was outlined, and the physical properties of this class of materials discussed.

Other cermet materials such as Al_2O_3-chromium, borides, silicides and intermetallics were briefly reviewed.

In summary, Professor Norton pointed out that to date the development of cermets has been largely empirical. This is, of course, a necessity and is as it should be. However, the time is now ripe for a fundamental approach. Professor Norton suggested the use of glass beads surrounded by a plastic as a means of studying aggregates similar to cermets and relating their behavior to that of cermets. He called for a systematic study of the failure of, for example, nickel-bound titanium carbide, so that a more complete understanding of the role of the binder and of the refractory particles can be obtained.

Professor Norton pointed out that there is an urgent need for a better understanding of cermets to permit good engineering use of their favorable points, with design compensating for the poorer properties.—**Reported by George Stern for the New York Chapter.**

Talks on Rare Earths In Iron and Steel

Speaker: Norman Tisdale, Jr.

Molybdenum Corp. of America

The Philadelphia Chapter, Junior Section, heard a talk by Norman Tisdale, Jr., development metallurgist for the Molybdenum Corp. of America on the subject of "Rare Earths in Iron and Steel".

Mr. Tisdale discussed the use of the rare earths, their effect on working stainless steels (increased yield), possibility of their replacing manganese in steel, their use in changing the graphite flake to the nodular form in cast iron and their effect on platinum.—**Reported by F. J. Klein for the Philadelphia Juniors.**

Heppenstall Buys Plant

The Heppenstall Co., steel forgings manufacturer, has recently purchased the former Chapman-Price steel plant in Indianapolis as a part of their $2,000,000 expansion program. Mr. Heppenstall, president, hopes to have the Indianapolis plant in operation within 15 months.

Talks on Fabrication of Magnesium and Its Alloys In Northern Ontario

Speaker: C. E. Kimmel
Dow Chemical Co.

A display of complex die castings, extruded shapes and deep drawn magnesium alloys highlighted a talk on "Magnesium and Its Alloys" given by C. E. Kimmel before the Northern Ontario Chapter.

Mr. Kimmel stressed the many advantages of the favorable strength-to-weight ratios of magnesium products in the aircraft industry, where magnesium finds its greatest application. Magnesium, however, is not limited to service in any one industry, and from the excellent slides Mr. Kimmel showed, it became apparent that the "wonder metal" is used in a variety of applications comparable only to steel products. Magnesium is finding an ever increasing demand in such fields as structural shapes, living room furniture and cathodic protection.

Because of its variety of end uses, fabrication methods must of course be varied. Magnesium may be die cast, sand cast, shell or wax molded, extruded, rolled, drawn, press forged, impact forged or chill cast. It is also welded successfully with a number of fluxes.

Extrusion and die casting account for most of the production of this metal, and both of these methods allow for a measure of complexity in a part, not readily obtained in other structural metals.

Mr. Kimmel covered a great deal of general information in his talk and provided a wealth of detail on the various processes in the lively discussion that followed.—**Reported by J. Vincent for the Northern Ontario Chapter.**

Predicts Industrial Uses For Atomic Power Plants

Speaker: Alfred Amorosi
Argonne National Laboratory

Atomic energy will be used to provide industrial power in the foreseeable future, according to Alfred Amorosi, associate director of the reactor engineering division, Argonne National Laboratory, who spoke on "Industrial Uses of Atomic Power" at a meeting in Peoria.

Man's imagination is not big enough, the speaker said. The average man cannot foresee the possibilities of atomic energy, but neither could he foresee the automobile with its internal combustion engine, the airplane, television and countless other technical advances which have been made in the first half of this century. It is the same with atomic energy, whose future is difficult to predict, but Mr. Amorosi made it clear that the potential uses of atomic power in the industrial field are numerous.

The cost of atomic power at present is prohibitive, due to the high cost of development, but the basic materials are relatively inexpensive and future costs of setting up atomic power plants can compete successfully with the costs of conventional power plants. Operating costs of the atomic power plants can be expected to be about the same or lower than costs in existing plants. Fuel costs can be expected to be definitely lower.

Mr. Amorosi listed two types of reactors used in atomic energy research—the fast reactor and the thermal reactor. The thermal reactor is more likely to be used for central station power in populated areas. The speaker brought out such problems encountered in reactor construction as the metallurgical development work incurred by the requirement of high corrosion resistance of system materials.

Other industrial applications, such as the use of the radioactive material from the atomic pile as tracers in wear research, biological studies and others were also discussed.—**Reported by W. O. Kaarlela for the Peoria Chapter.**

Discusses Fatigue Failures in Large Parts

W. Hughes White (Right), Chairman of the New Jersey Chapter, Is Shown Presenting a Certificate to the Speaker, H. R. Neifert, Timken Roller Bearing Co., at a Recent Meeting. Mr. Neifert discussed "Fatigue Failures in Large Parts" and illustrated his lecture with slides

Speaker: H. R. Neifert
Timken Roller Bearing Co.

H. R. Neifert, supervisor of railway research for the Timken Roller Bearing Co., explained at a meeting of the New Jersey Chapter how "Fatigue Failures May Be Minimized in Large Parts", such as railroad axles. His talk was illustrated with many excellent slides.

All parts subject to cyclic stress are candidates for fatigue failure. There is a very significant mass effect and large parts develop but a fraction of the relative fatigue resistance of small laboratory specimens. A design stress based upon the conventional endurance limit of a metal and a stress-concentration factor neglects the effect of internal stresses, surface condition and notch sensitivity. The safe working stress is therefore much lower.

Changes in design in accordance with stress analysis of a loaded part will often greatly improve its fatigue resistance. For example, a small increase in the diameter at the wheel seat of press-fitted railroad axles to obtain a "raised seat" effect improved fatigue resistance by 60%.

In large parts, cold rolling at critical locations such as press fits and fillets has been found to markedly increase fatigue life. Effective cold rolling penetrates ¼ to ⅜ in. below the surface. Shot peening is advantageous for small parts. Both introduce beneficial compressive residual stress in metal at and just below the surface.

Heat treatment of large parts is not necessarily advantageous unless compressive residual stresses are developed at the surface. If surface tensile stresses are developed as a result of heat treatment, fatigue resistance may be lower despite some improvement in basic strength.—**Reported by Raymond A. Grange for New Jersey.**

Traces Progress of New Varieties of Stainless Steels

Speaker: M. E. Carruthers
Armco Steel Corp.

"Precipitation Hardening Stainless Steels" was the subject discussed by M. E. Carruthers, supervising metallurgist of the research laboratories of the Armco Steel Corp., before a meeting of the Columbus Chapter.

Although all stainless steels are fairly strong, only two were used at room temperature for high-strength applications prior to the development of the precipitation hardening types. One was the hardenable chromium type hardened by the transformation of austenite on air cooling from a temperature of 1600° F. or above. These hardened steels have the disadvantage of being difficult to machine; in addition, a tempering treatment is often required to obtain the required toughness. The other was cold rolled Type 301, nominally 17 Cr-7 Ni. It has the disadvantages that few presses can handle it in thicknesses greater than ⅛ in. and that the spring-back is abnormally great. These facts led Armco in 1941 to their first serious consideration of precipitation hardening stainless steels. Research centered on chromium-nickel compositions on the border of being austenitic on transformation. The approach used was to control the composition to obtain the right instability of the austenite. As a result of this research, 17-4 PH and 17-7 PH were in production by 1948.

The 17-7 PH grade, which contains 1.10% aluminum, is supplied in the annealed form in which the structure is predominately austenitic. After fabrication it is transformed by heating at about 1400° F. for 90 minutes and air cooling. This gives a structure of martensite, retained austenite and ferrite. After transformation, this grade is hardened further by a precipitation treatment of 90 minutes in the range 950° to 1050° F., followed by air cooling. A typical yield strength (0.2% offset) of 190,000 to 200,000 psi. is attained.

Because of its high strength-weight ratio, 17-7 PH is finding some use in the aircraft industry as structural sheet and strip and in the guided-missile program for fuel and air tanks. Hardened 17-7 PH retains its strength upon long exposure at temperatures up to 600° F. Its strength-weight ratio is higher than that of aluminum at 80° F., and higher than that of either aluminum or titanium at 400° to 600° F. Thus, it may find use in aircraft skin which may be heated to temperatures up to 500° F. in sea-level flight at a speed just twice the speed of sound.

Corrugated diaphragms for pop-off valves also make use of its excellent elastic properties. With a superior endurance strength of 90,000 psi. at 50 million cycles, it is being used for interior leaf springs in microswitches.

The 17-4 PH grade contains copper and columbium. Unlike 17-7 PH, it is supplied in the transformed condition and may be hardened by a single heat treatment. Aging at 900° F. produces a 0.2% yield strength of 180,000 psi., with unusually small dimensional changes. The hardness is Rockwell C 30 to 36 as supplied and 40 to 44 after hardening, as compared with Rockwell C 48 or more for cold worked and hardened 17-7 PH. It is currently finding use in light-weight high-strength parts for pilot ejection seats in military aircraft. Its antigalling properties at high stresses led to its use as valve plugs in Type 316 stainless valves.

The speaker described briefly the current trends in stainless steel production. The extra low carbon (ELC) stainless steels with 0.03% maximum carbon may be used continuously at temperatures up to 800° F. and may be welded without the precipitation of carbides leading to intergranular corrosion. With an estimated 90% of stainless steel being used below 800° F., Type 304-L will undoubtedly be used more and more in place of the stabilized grades.

During the first nine months of 1953, 836,000 ingot tons of stainless steel were produced, about two-thirds of it being of the straight chromium types and about two-thirds Type 430, used mostly in automotive applications. The addition of titanium to Type 430 to achieve better drawability is also a significant development. A Cr-Mn-Ni-N stainless steel containing only 4% nickel is being used for the exhaust valves in one of the 1954-model automobiles. — **Reported by Ellis Fletcher for the Columbus Chapter.**

Relates Iron-Steel Industries to the History of the World

Speaker: H. B. Knowlton
International Harvester Co.

Sustaining members of the Canton-Massillon Chapter were honored at a dinner meeting after which Harry B. Knowlton, materials engineering department, International Harvester Co., spoke on the "Steel Industry and Its Effect on World History".

Mr. Knowlton covered the development of the iron and steel industries and their relation to geography and world history with primary attention placed upon the last 100 years. The economics and military advantages of countries which have abundant mineral supplies have been of utmost importance and are expected to become increasingly important. Technological developments have helped countries utilize low-grade ores and substitute materials. However, the alloy shortage is making countries more dependent on each other. The United States and other nations cannot keep up with the rapidly increasing demand for high alloy steels for jets, etc.

Mr. Knowlton then presented some interesting observations on his recent trip to seven countries in Europe on a two-man government mission to discuss the merits of boron steels with European metallurgists. —**Reported by W. P. Benter, Jr., for Canton-Massillon.**

Milwaukee Hears Talk on Research and Methods Of Machining Metals

Speaker: E. J. Krabacher
Cincinnati Milling Machine Co.

"Research and Methods of Machining Metals" was the title of the talk presented before the Milwaukee Chapter by E. J. Krabacher, research engineer for the Cincinnati Milling Machine Co.

Mr. Krabacher approached the subject of machinability by presenting a background of the fundamental metal-cutting process, explaining the formation of metal chips, the three types of chips produced and their relationship to the shear angle developed by tool geometry. The role of cutting fluids was discussed along with the economics of the processes. A brief description of a new method developed for evaluating cutting fluids, work materials and tool geometry through the use of radioactive cutting tools was presented. Rapid evaluating of tool wear is possible with this method, results indicating that more than 90% of the wear products adhere to the chips.

E. J. Krabacher

Mr. Krabacher's entire discourse was supplemented by lantern slides and a movie entitled "Fundamental Aspects of Metal Cutting and Cutting Fluid Action".

The Milwaukee Chapter sponsored an educational course in "Metallurgy at Work" during the month of November. Highly qualified speakers in the metal field from the Milwaukee area presented at weekly meetings information on how metallurgy works to develop and maintain the desired characteristics in the manufacture of metal parts and the solution to plant problems and in the development of new products. These courses, which were held at Marquette University, were very well attended. — **Reported by E. H. Schmidt for the Milwaukee Chapter.**

Series on Metallurgy at Work in Milwaukee

Shown Above Is a Typical Attendance During One of the Milwaukee Chapter's Educational Lectures on "Metallurgy at Work". Speakers for this popular series were highly qualified men in the metal field from the Milwaukee area. A list of subjects and speakers for this course appeared on p. 18 January **Metals Review**

Speakers Combine to Discuss Uses of Gas in Metallurgical Industry

Speakers: R. A. Dunn and Guy Savard

Canadian Liquid Air Co. Ltd.

A meeting of the Ottawa Valley Chapter held recently had an unusual aspect in that two speakers combined to deliver the address on the "Use of Gases in the Metallurgical Industry". R. A. Dunn, general sales manager, Canadian Liquid Air Co. Ltd., introduced the subject and outlined the industrial growth and spreading uses of gases, mainly oxygen, in many industries.

Mr. Dunn pointed out that in 1924 the metallurgical camp could see no point in doing further research work on the application of oxygen-enriched atmospheres to metallurgical processes until large quantities of low-price oxygen were available, and, similarly, the gas producers could see no point in developing methods of producing large amounts of low-price oxygen until there was a market for it. A symposium held that year made the decision to continue the research which has led to the developments of the last three decades. Today metallurgical users are the outstanding tonnage consumers of oxygen and the field is yet new.

Guy Savard, development and engineering department, outlined some of the developments of oxygen-enriched atmospheres for use in metallurgical industries. For his main example he discussed the L-D method used in the conversion of blast furnace iron and its advantages over the standard methods. He closed by touching briefly on his company's intended future work in the use of oxygen and oxygen-enriched atmospheres in the metallurgical field.—**Reported by S. A. Agnew for Ottawa Valley.**

The Metallographic Parade

Every year since 1946 the American Society for Metals has held a metallographic exhibit and competition at the annual Metal Congress and Exposition. While no count of attendance has been made, it has been most gratifying for the metallographic exhibit always contained several people studying the photographs or arguing over the correctness of the judges' awards.

In view of this interest and of the extraordinarily high quality of the work on display, the A.S.M. management has decided to retain all photographs entered in the forthcoming exhibit at the Metal Show next November and place them in a traveling exhibit, going the rounds from chapter to chapter in a well-organized tour, all through the winter and spring of 1954-1955. Thus the leading metallographers and their work will become widely known among the metals engineers of America.

Do not neglect this opportunity. The rules are few and simple; they are stated in the advertisement on p. 2. Get organized *now* to join the metallographic parade of 1954!

A.S.M. Visiting Lecturer Speaks at Missouri School Of Mines and Metallurgy

Speaker: A. J. Shaler

Amos J. Shaler, A.S.M. visiting lecturer, presented lectures on "Powder Metallurgy", "Work Function of the Iron Blast Furnace" and the "Development of the Low-Shaft Blast Furnace" during a recent visit to

the School of Mines and Metallurgy of the University of Missouri. One of the talks was given before a regularly scheduled class to which other students had been invited, one before a meeting of the Missouri School of Mines and Metallurgy Chapter A.S.M., and one before a group which included industrial leaders that had been invited to the University for the occasion.—**Reported by A. W. Schlechten for Missouri School of Mines and Metallurgy.**

Analyzes Metals by Spectrography

Arthur A. Burr (Right), Who Spoke on the "Application of Spectrographic Techniques to Metallurgical Problems" at New Haven Recently, Is Shown With Robert M. DeVarney, Technical Chairman. (Photograph by J. L. Baker)

Speaker: Arthur A. Burr

Rensselaer Polytechnic Institute

Arthur A. Burr, Rensselaer Polytechnic Institute, presented a talk on the "Application of Spectrographic Techniques to Metallurgical Problems" before the New Haven Chapter recently.

The general fundamentals of the techniques were discussed first. The whole basis of the process is that of displacement of valence electrons from the metal atoms, thereby creating "excited" atoms. The various energies radiated by the return to normal conditions produce a spectrum of light of different wave lengths which constitutes a "finger-print" of the atom and is practically independent of its environment. The amount of an element present in an alloy can then be calculated from the relative intensity of the various lines or wave lengths in its spectrum.

The speaker pointed out that there are five basic elements to this analytical tool wherein the operator has the choice of equipment or procedure. These are: Type of sample and sampling technique; experimental devices for causing the excitation of the atoms; method of collecting the light from the radiating metal atoms and spreading out the spectrum of various wave lengths of which it is composed; procedure for recording this spectrum, either photographically or by electrical devices; and reduction of the recorded spectrum to actual concentrations of the constituents of the alloy.

All variables except concentration are held constant by comparing all intensity measurements to the intensity of a spectral line from the matrix which is known to be of constant intensity for all spectra. Analysis is generally achieved by comparison of measurements from spectra of an unknown alloy to standard samples of similar constitution, the concentrations of which are accurately known.

Professor Burr used slides to illustrate his talk and to show the range of accuracy and reproducibility that could be expected. He then discussed modern developments in the techniques, chief among which were:

1. Cheaper equipment and its impact on the economics of this type of analysis.
2. Greater speed as a result of automatic recording equipment.
3. Solution techniques which simplify reference standard problems.
4. High precision for work with the transition elements as a result of the introduction of the "echelle" to increase dispersion.—**Reported by Glenn F. Whiteley for New Haven.**

Ultrasonics in Research And in Industry Subject Of Rhode Island Lecture

Speaker: Grant S. Bennett

General Electric Co.

The Rhode Island Chapter heard Grant S. Bennett of the General Electric Co., speak on "Ultrasonics in Research in Industry" recently.

The first part of Dr. Bennett's talk was devoted to a general discussion of that range of sound waves comprising ultrasonics. He pointed out that because of the high frequency, large intensities are somewhat more readily available. This was followed by a discussion of various methods of producing ultrasonic waves, and in particular, magnetostrictive and piezo-electric oscillators, including the ferro-electrics. Dr. Bennett then gave reasons for the interest of a pure research scientist in ultrasonics, data on the small wavelength, and information relative to the elastic properties and the molecular nature of the medium as gained from studies of absorption.

Some time was devoted to the various optical methods for observing the ultrasonic wave in liquids and solids, including light diffraction, *schlieren* and shadowgram techniques. Other methods, analogous to light photography, were discussed with particular reference to their application to flaw detection methods.

The last part of the talk was concerned with industrial interest in ultrasonics. Industrial applications were divided into two groups—those depending primarily upon the wave nature of sound, and those depending primarily on the high energies available with ultrasonics. In the first class such applications as flaw detection, which is, of course, well established, and such other possible applications as measurement of viscosity, measurement of flow rate and measurement of molecular weight were discussed. In the second class the discussion centered around such applications as smoke precipitation, dispersion of metals, reduction of grain size in castings, the ultrasonic washing machine, and, possibly the most spectacular success of ultrasonics at this time, the cleaning of small parts.

In conclusion, the economic aspects of ultrasonics were discussed. Dr. Bennett pointed out that although an ultrasonic installation is reasonably expensive, in many cases long-range savings have been effected.—**Reported by Warren Hagist for the Rhode Island Chapter.**

Modern Methods of Nondestructive Testing

Speaker: M. D. Phillips

Battelle Memorial Institute

"Nondestructive Testing" was the subject of a talk given at Toledo by M. D. Phillips, research engineer at Battelle Memorial Institute.

The speaker first pointed out the more modern methods and machines in use in the field of nondestructive testing. Various phases covered during the talk were radiography, both the wet and dry methods of magnetic-particle inspection, the tribo-electric method, the penetrant methods and ultrasonics. A brief description was given for each method along with the description of commercial equipment and examples of the application of the equipment.—**Reported by M. M. Schrecongost for Toledo.**

British Columbians Visit Cleveland Dam

On a cold, snowy Saturday morning in January, about 40 members of the British Columbia Chapter visited the Cleveland Dam on Capilano Canyon in North Vancouver, through the courtesy of the Greater Vancouver Water Board. The tour was conducted by Messrs. Halland and Rowe, of the Water Board engineering staff, who explained the various features and complications which arise from such a project.

The Cleveland Dam is not very wide, comparatively speaking, but it is unusually deep (629 ft.). In its construction, the earth excavation for the dam and burrow was 460,000 cu. yd., rock excavation 110,000 cu. yd. The total concrete, which was mixed and poured right on the spot from Canadian Portland cement, amounted to 141,000 cu. yd. The reinforcing steel placed amounted to 575 tons. To commence work on the dam proper, a diversion tunnel 31 ft. 6 in. in diameter by 960 ft. long first had to be constructed. After completion of the concrete work, 250,000 cu. ft. of fill material had to be dumped in position. The length of the galleries and tunnels inside the dam totals 1300 ft. In these galleries are located the valves and operation mechanisms for the delicate control of the drum gate which maintains the artificial lake behind the dam at constant level. This gate, a triangular shaped hollow drum of structural steel, approximately 70 ft. deep by 23 ft. high and weighing 233 tons, is balanced so any variations in water level or temperature are immediately compensated.

The spillway, which is designed with a sweeping effect curving outwards at the bottom, has serrated abutments to break the fall of the water and throw it outwards before falling the remainder of the way to the bottom of the canyon. This was done for several reasons, the main ones being to alleviate as much as possible erosion at the bottom of the pool, and to help prevent the high mortality of the salmon after spawning when returning to sea. Fish ladders are provided further down the canyon for the fish coming in to spawn.

Due to the faults located in the terrain, 12,000 ft. of diamond drilling was necessary, concrete being forced in until the mass became plugged in order to create a solid permanent mass.

The project to date has cost 10 million dollars. It is due to start operating this summer, when a reservoir about 10 miles long by ½ mile wide and 300 ft. deep at the lowest point will be created for supplying the additional water needs in the coming years for the Greater Vancouver area. This is the largest dam in the British Empire.—**Reported by R. H. Fenton for British Columbia.**

Talks on High-Temperature Corrosion

Shown Are, From Left: W. Z. Friend, International Nickel Co., Inc., G. M. Adamson, Oak Ridge Chapter Technical Chairman, and E. N. Skinner, International Nickel Co., Inc., Who Spoke on "High-Temperature Corrosion"

Speaker: E. N. Skinner
International Nickel Co.

E. N. Skinner of the International Nickel Co., addressed the Oak Ridge Chapter on the subject of "High-Temperature Corrosion" recently. Dr. Skinner's lecture covered the fundamental aspects of the corrosion phenomena, as well as a view of specific studies of special interest to the manufacturers and users of nickel-containing alloys.

High-temperature corrosion has long been recognized, but its significance perhaps not fully appreciated. However, as industry strives toward higher efficiencies and temperatures, knowledge of the behavior of materials at the required conditions becomes of prime importance. Oxidation, the nemesis of most structural materials at high temperatures, has been the subject of much basic research with regard to mechanisms and possible control. The characteristics of oxidation in most metal systems depend greatly upon the characteristics of the oxide formed as a product, the metal oxide ideally serving to separate the reactants and thus lower the rate of attack. Slides were shown to the group illustrating the results of basic oxidation studies and their conformity to the well-known rate theories.

Since control of corrosion at high temperatures by adjustment of environment is not often permitted, the proper choice of a satisfactorily resistant material is the most applicable method in a majority of cases. Knowledge necessary for the proper selection of resistant metals and alloys in specific environs may be obtained directly from the field or from laboratory tests simulating operating conditions. These tests are not limited to oxidation alone since gaseous corrosion occurs under a multiplicity of different atmospheres, notably those containing carbon, nitrogen, and sulfur.

Dr. Skinner presented the results of corrosion studies of various nickel-chromium-iron base alloys in environments classed as sulfidizing, carburizing and nitriding, as well as fused salts and vanadium-containing oil ash. The reactions were discussed and illustrated with slides showing the nature of the attack as a function of the alloy composition in each case. Some general correlations have been made relating corrosion resistance in these alloys to composition, but it still remains for results of laboratory tests to furnish reliable data concerning unique corrosion problems.—**Reported by Richard E. Pawel for Oak Ridge.**

New Technical Society

The Hamilton Iron and Steel Branch of the Canadian Institute of Mining and Metallurgy has recently been formed. This is the only iron and steel branch in Canada and will represent the technical and operating aspects of the industry. It has been organized to serve the interests of the Canadian iron and steel industry, the growth of which in recent years has indicated the need for such an organization.

Cleveland Engineering Center

A $1,378,000 building and development program for the construction of a new downtown Engineering Center has been announced by the Cleveland Engineering Society. To be known as the Cleveland Engineering Center, the two-story structure will be of contemporary design and will provide facilities aimed at making it the focal point of all engineering activities in northeastern Ohio.

Gives Tips on Production Improvement Methods

At the Speakers Table During a Recent Joint Meeting of the St. Louis Chapters A. S. M. and A. S. T. E. Are, From Left: Julius Turk, A. S. M.; Oliver Scott, Treasurer A. S. T. E.; A. H. Hunnius, Treasurer A. S. M.; R. D. Bardes, A. S. M.; Willis Pottlhoff, Chairman A. S. T. E.; Martin Huether, Chairman A. S. M.; J. Y. Riedel, Who Spoke on "Improving Production From Tools and Dies"; G. A. Fisher, Jr., A. S. M.; Irwin Schumaier, Vice-Chairman A. S. T. E; and Clarence Hall, Program Chairman for A. S. T. E.

Speaker: J. Y. Riedel
Bethlehem Steel Co.

The St. Louis Chapters of the American Society for Metals and the American Society of Tool Engineers heard J. Y. Riedel, Bethlehem Steel Co., speak on "Improving Production From Tools and Dies", at a joint meeting held recently. Mr. Riedel talked from the point of view of experienced shop personnel.

Good tooling requires a combination of good tool design, sound toolsteel of the correct grade, proper heat treatment, proper grinding practice and correct application of the tools in service.

Such factors as drastic change of section and sharp corners can cause trouble, the speaker pointed out. He discussed the necessity of avoiding blind holes and sharp-cornered keyways, and stated that tapers are better than fillets in pneumatic tools. Improper clearances and overloading reduce tool life. Emphasis was placed on how various design improvements can be made by prestressing and unloading notches.

Mr. Riedel described how to detect defects and how to determine when the steel is at fault. He emphasized that the right toolsteel should be selected for each type job. He discussed special heat treatments such as carburizing, nitriding, differential hardening, short-cycle hardening and rehardening. The effect of stresses generated by grinding and of the direction of grinding scratches were discussed during the speaker's explanation of grinding operations.—**Reported by Frank Delaplane for the St. Louis Chapter.**

Uhlig on Corrosion at Columbia Basin Meeting

The Columbia Basin Chapter heard H. H. Uhlig, Massachusetts Institute of Technology, discuss "Fundamentals of Corrosion" at a recent meeting. A splendid turnout of 46 members and 28 guests enjoyed Dr. Uhlig's very interesting discussion.—**Reported by L. D. Turner for Columbia Basin.**

Ottawa Valley Hears Description of the Asarco Casting Process

Speaker: John L. Kimberley
American Smelting & Refining Co.

John L. Kimberley, sales manager of continuous casting products, American Smelting & Refining Co., gave a talk on the "Asarco Process for Continuous Casting of Copper-Base Alloys" at a meeting of the Ottawa Valley Chapter.

Mr. Kimberley pointed out the long-held desire of man to produce finished products directly from the molten state, thereby eliminating intermediate forming steps. This applies, of course, only to those shapes and sizes which are not amenable to the standard methods of casting. He then gave a brief historical sketch from Bessemer's first attempt at continuous casting through the numerous experimental and production techniques known today, before discussing the Asarco process.

The Asarco process was outlined and explained with the aid of three sets of slides. The vertical production line takes advantage of gravity for metal flow and product draw-off. The arc furnace is situated on a top floor, and the charge boxes are loaded at ground level (oxygen content of the charge is carefully kept below a set maximum). This furnace empties into a resistance heated holding furnace with a graphite crucible, the atmosphere above the melt being dry nitrogen. The melt is gated out to the die chamber (gravity) and held by a starting plug in the die which controls the start of the casting process. The die is cooled by a water jacket (closed circuit). In the die chamber, controlled by a rod through the top of the holding furnace, is a shut-off plug for use in die failure or other accident. As casting commences, the product is guided down to a set of guide and feed rolls. Another cooling jacket is applied to the product above the rolls. Casting continues until the required length is reached, at which point the cut-off saw drops the length upright into a dumping bucket which discharges it onto a roll-top table conveyor. As the saw cuts the length off, in the case of the larger weight for foot products, the heavy load from the feed-guide rolls is removed, and it is important to see that the rolls do not reverse (backlash) or the die will be ruined.

The special grade of graphite used in the process takes a hard machining polish and, in general, is a throw-away item after one run. Alloys amenable to the process were discussed and it was pointed out that the graphite crucible absorbs lead from a lead-bearing melt and gives it up to a nonlead-bearing melt so they use some furnaces for lead-bearing melts only. Mr. Kimberley brought out the fact that copper alloys containing aluminum leave an alundum coating on the die which is detrimental since it interferes with heat transfer. The policy of further research to expand the application of the continuous casting process to alloys which at present cannot be utilized was also discussed.—**Reported by S. A. Agnew for the Ottawa Valley Chapter.**

Construct "Hot Canyon"

The Ames Laboratory of the U. S. Atomic Energy Commission at Iowa State College, under the direction of F. H. Spedding, has completed construction of a "hot canyon" area for experiments in reprocessing atomic fuel for re-use in power reactors. This area, designed for handling fissionable materials and high-level radioactivity, is located in the Research Building.

Within the 60 x 28 ft. canyon is a trough 33 ft. long in which radioactive material is placed. Shielded from the "hot" material by an 8-in. steel wall 10 ft. high, workers conduct experiments in the cave by means of remote control devices, sometimes called "master-slave manipulators". Lead glass windows permit operators to view their work.

Discusses Role of New Light Alloys In Building Aircraft

Speaker: Harry J. Boertzel
U. S. Navy
Bureau of Aeronautics

ZK51A, EK30, AZ63A, EM61, XA78S, R301, HZM-100, SAP, Hy Tuf. You name them, we have them. This is not a new alphabet soup or a list of new alphabetical organizations, but a list of some of the new alloys of aircraft design presented to the Jacksonville Chapter by Harry J. Boertzel, metallurgical specialist, Navy Department, Bureau of Aeronautics, at a recent meeting.

New magnesium, aluminum and titanium alloys will soon find their place alongside existing alloys such as 24S, 75S, SAE series, etc. Although they appear strange today, one will do well to remember these alloys since future aircraft design will no doubt incorporate many of these new metals.

The new magnesium-lithium base alloys, possessing tensile strengths as high as 55,000 psi., as compared with approximately 25 to 30,000 psi. for present high-strength magnesium alloys, were discussed. Ingots, billets and slabs of the magnesium-lithium base alloys have received preliminary commercial evaluation but require additional study and development to make them commercially acceptable. Some of the magnesium casting alloy compositions receiving a great deal of attention are ZK51, AZ53 and AZ91A. To these can be added EK30XA, EZ33XA, ZREI for high-temperature applications.

In the aluminum field, Mr. Boertzel traced the evolution and development of high-strength aluminum alloys from the early days of 17S through the recently developed high-strength XA78S aluminum alloy. With each type of aluminum alloy, the application becomes more specialized, and the responsibility of the design engineer becomes greater and greater, depending upon the requirements of the aircraft of tomorrow. Aluminum alloys possessing a tensile strength of 100,000 psi. have already been made and are currently undergoing evaluation.

One of the latest arrivals on the aluminum scene is alloy XZM-100, introduced by the Harvey Machine Co. In the extruded form it is reported to possess a tensile strength of 92,000 psi., with 11% elongation. Aluminum alloy XA78S is currently being evaluated with XZM-100 for aircraft applications and new aircraft designs.

Aluminum alloy SAP represents a new Swiss development of a high-temperature aluminum alloy in the sintered aluminum powdered field. This alloy represents a major advancement over light alloys since it can be used at temperatures approaching 800° F. The composition of SAP is equivalent to 2S aluminum with a content of 10 to 20% by weight of aluminum oxide.

The use of titanium base alloys is becoming greater in aircraft design. A recent titanium development disclosed the successful attainment of an alloy possessing strengths in excess of 200,000 psi. The titanium field is great and considerable developments with this alloy are anticipated in the near future.

An added feature of the meeting was the showing of the United Aircraft Corp.'s latest historical film on aviation entitled "We Saw It Happen". This film was given its premier Florida showing at the Jacksonville meeting.—**Reported by Walter S. Morris for the Jacksonville Chapter.**

Announce Plant Expansion

The Crucible Steel Co. of America and the National Research Corp. have joined forces to accelerate development of the vacuum melting of steels and other alloys. Crucible has acquired a 50% interest in the Vacuum Metals Corp., formerly a wholly owned subsidiary of National Research, which is producing vacuum-melted steels and other metals in commercial quantities and is the country's only commercial producer of these high-purity metals.

New vacuum-melting facilities will be constructed in Syracuse, N. Y., in an expansion program that is expected to increase Vacuum Metals' capacity by more than 500% in the next 12 months.

Talks on Properties of Titanium Alloys

Shown at a Meeting in Los Alamos Are, From Left: Robert T. Phelps, Technical Chairman; Thomas K. Redden, Supervisor of Alloy Development, Titanium Corp. of America, Guest Speaker; Donald E. Grimm, Chapter Chairman; and Robert Ronzio, Whose Project "Crystals and Their Uses" Won a First-Place Award in the A.S.M. Science Achievement Award Program

Speaker: T. K. Redden
Titanium Metals Corp. of America

Thomas K. Redden, supervisor of alloy development, Titanium Metals Corp. of America, discussed the "Influence of Metallurgical Factors on the Mechanical Properties of Titanium Alloys" at a meeting in Los Alamos.

He stated that some porosity is found in titanium ingots due to hydrogen, but that the pores are readily eliminated by working on ingots. Although cracking in some titanium alloys has given trouble, improved grinding methods have minimized this difficulty. Inclusions are practically nonexistant if carbon is held below its solubility limit of 0.1%. Oxides and nitrides are not present as inclusions due to the relatively high solubilities of oxygen and nitrogen in titanium.

Mr. Redden divided the alloying elements used with titanium as to whether they stabilized the low-temperature alpha structure or the higher temperature beta structure. Aluminum, carbon, nitrogen and oxygen fall in the first class and the other common addition elements fall into one of two types of beta stabilizers —the eutectoid and the isomorphous types. The better commercial alloys are two-phase alloys at room temperature. After some initial difficulties with heat treatment procedures titanium alloys have been successfully used in such applications as jet engine compressor components at operating temperatures to 900° F.

Robert Ronzio, special guest of honor, was the Regional First Place Winner in the 1953 contest conducted by the Future Scientists of America Foundation. His project was entitled "Crystals and Their Uses".—**Reported by R. E. Tate for the Los Alamos Chapter.**

Describes Titanium Plant in Chattanooga

Seated at the Table During the Annual Joint Meeting of the Chattanooga Chapters of the American Society for Metals and the American Welding Society Were, From Left: L. N. Wall, A. S. M. Secretary - Treasurer; Jack Stocker, A. S. M. Vice-Chairman; Ab Flowers, A. S. M. Chairman; G. J. Morrow, Vitro Corp. of America, Guest Speaker; Jim W. Koch, A. W. S. Chairman; C. A. Miller, A. W. S. Secretary; and R. E. Barrett, A. W. S. Treasurer

Speaker: G. J. Morrow
Vitro Corp.

The Chattanooga Chapter was host to the local chapter of the American Welding Society at the annual joint meeting of the two societies. G. J. Morrow, resident engineer, Vitro Corp., the speaker, described the "Design and Construction of the Titanium Plant" the Vitro Corp. is constructing in Chattanooga.

The past history of titanium was also discussed. This history included titanium's use in the paint industry and proceeded to the modern phases in which titanium is thought of as a wonder metal for use in the aircraft industry. The location of ores and the high cost of the metal were also noted.

The speaker described the physical properties of titanium in the low, medium and high-temperature ranges. He brought out the fact that titanium, due to its high corrosion resistance to all corrosive media, will probably become extensively used in food processing equipment, chemical plants and ship building. Despite its high cost, there are some applications now where it is economical to use titanium instead of other corrosion resistant alloys.

Due to unforseen heavy work loads, both the chairman, Carl Thigpen, and the vice-chairman, J. T. Cawthorne, have been forced to tender their resignations as officers of the Chattanooga Chapter. At a special emergency meeting held by the Chapter, Ab Flowers was appointed chairman and Jack Stocker vice-chairman to serve the remainder of the unexpired terms of Mr. Thigpen and Mr. Cawthorne.—**Reported by C. R. Pandelis for Chattanooga.**

Tells How to Select the Correct Welding Method

Speaker: John J. Chyle
A. O. Smith Corp.

Members of the Northern Ontario Chapter heard an informative talk entitled "Factors in the Selection of Welding Processes" at a recent meeting. The speaker was John J. Chyle, director of welding research, A. O. Smith Corp., and 2nd vice-president of the American Welding Society.

Beginning with a broad definition of welding as a method of joining metals, Mr. Chyle illustrated the classification of welding methods adopted by the A.W.S. The major classification contains the following methods in order of importance: Arc welding, resistance welding, gas welding, brazing, forge welding, thermit welding, induction welding and flow welding. Each method was further subdivided until some 37 welding processes were described.

With competition so keen that welding costs are sometimes figured to 1/10 of a mil, it is important to select the most economical method that gives a commercially adequate product. The selection of a welding process depends upon the interaction of a number of factors including service requirements, engineering design, material, weld characteristics and design, production rate, power availability and process economics.

Welding cost is a guiding factor in selecting the welding process, under the condition that service and quality requirements be met. Additional savings may be brought about by the proper design and selection of material for the welded product so that the most economical method may be effectively applied.

The address was supplemented by numerous colored slides illustrating each phase of the talk.—**Reported by John G. Underwood for the Northern Ontario Chapter.**

Indiana to Hold Sixth Annual Spring Symposium

The Sixth Anniversary Spring Symposium of the combined Indiana Chapters of A.S.M. will be held at Purdue University, Lafayette, Ind., on Saturday, April 24. The subject of the symposium will be "Residual Stresses". The Indiana Chapters of the Society of Automotive Engineers and the Society for Experimental Stress Analysis have been invited to participate as guests.

Walter Jominy, A.S.M. past president and chief metallurgist of Chrysler Corp., will be master of ceremonies. Following registration at 8:30 A.M., a technical session will be held, with Charles Lipson, consultant of Ann Arbor, Mich., and E. S. Rowland, chief metallurgical engineer, Timken Roller Bearing Co., as speakers. Dr. Lipson's subject will be "Fundamentals of Residual Stresses", and Dr. Rowland will speak on "Measurement of Residual Stresses".

Luncheon will be held at the University, and Raymond L. Mattson, assistant head, engineering mechanics department, General Motors Research Laboratory, will be the afternoon speaker. A visit to the new Purdue Material Testing Laboratory will complete the program.

Cemented Carbides Topic At Saginew Valley Meeting

Speaker: B. W. Wright
Carboloy Co.

"Cemented Carbides" was the subject of a talk given by B. W. Wright, manager of the Carboloy Co., at a recent meeting of the Saginew Valley Chapter.

Mr. Wright stressed the past, present and future growth and uses of the different types of cemented carbides. The tremendous use of increased automatic and power speeds by the machine tool industry has greatly increased the use of carbides, especially as cutting tools. Mr. Wright also discussed the making of carbides and the uses of the various grades.—**Reported by J. R. Beal for Saginaw Valley.**

Doctor of Metallurgy Prescribes Medicine For Steelmaking

Speaker: C. B. Post

Carpenter Steel Co.

Rare earth metals are proving a potent "medicine" in steelmaking. Minute quantities often have a beneficial effect, such as relief of hot-shortness, in austenitic steels containing more than 20% nickel.

C. B. Post, chief metallurgist of the Carpenter Steel Co., described the work his company has done with "mischmetal" for the Buffalo Chapter in a talk on "Rare Earth Metals".

Just as the cause of hot-shortness is not known, neither is the mechanism by which mischmetal relieves it known. Oxygen, nitrogen, hydrogen and sulfur contents and grain structure are some of the factors which are suspected to cause poor plastic behavior of steel billets during rolling, but no one of these is universally accepted by leading authorities.

Although the 18-8 stainless steels are not ordinarily regarded as hot-short, their workability can be improved by additions of rare earth metal oxides. Since the quantity required is very small, such additions do not cause excessive dirtiness. However, oxide additions to high-nickel austenitic steels will not relieve hot-shortness and with these steels it is necessary to add the rare earth metals as mischmetal. Residual contents of cerium and lanthanum (the principal constituents of mischmetal) will total only a fraction of 1%.

The forging shop benefits directly from the effect of rare earth metals on high-nickel austenitic steels. The relief of their inherent hot-shortness broadens the forging range as much as 400%.

Cerium fluoride is a low-melting point compound which is very useful in cleaning up steel before it is poured. However, it is limited to steels containing little or no titanium because it will not react with the oxide of this metal.

Other effects of rare earth metal additions have been observed. Type 304 stainless steel, containing small amounts of cerium and lanthanum, has a lower scale loss when heated in air.—**Reported by A. E. Leach for the Buffalo Chapter.**

Engineering Conference To Be Held at Ohio State

The first Annual Conference for Engineers will be held at Ohio State University on Friday, May 7, 1954. The morning program will be held in the new Ohio Union Building, where Charles F. Kettering will speak on "Getting Results From Engineering Research". Another nationally known speaker will address the noon banquet. The individual departments will present current research programs and have an open house in the afternoon.

The afternoon program of the department of metallurgy will include talks by J. W. Spretnak on the "Mechanism of the Boron Hardenability Effect"; J. O. Lord on "Fatigue"; W. A. Mueller on "Fuels"; R. Speiser on "Molybdenum"; and F. H. Beck and M. G. Fontana on "Corrosion".

The department of welding will hear talks by D. R. Mitchell on "Titanium Alloys"; N. Spielberg on "Metal Transfer"; W. F. Brown on "The Heat Affected Zone"; and R. B. McCauley, Jr. on "Radioactive Isotopes in Industrial Radiography".

Shell Molding Discussed at Dayton

F. W. Less, Field Representative, Durez Plastics and Chemicals, Inc., Discussed "Shell Molding" at a Meeting in Dayton. Shown above are, from left: DeWitt Gerstle, Chapter executive committee; O. W. Beardmore, Dayton Durez representative; Mr. Less; and J. G. Gantner, Chapter chairman

Speaker: F. W. Less

Durez Plastics and Chemicals, Inc.

"Shell Molding" was discussed by F. W. Less, field engineer for Durez Plastics and Chemicals. Inc., at a meeting of the Dayton Chapter.

Shell molding has been widely discussed the past few years, with a major part of the promotional work being done by the plastics industry following their own extensive research work in the field of molding and casting. The use of resins is not new in the foundry industry—thermosetting resins were introduced as core binders some years ago. Shell molding, as we now know it, is not a foundry cur-all—it is simply another method by which casting is possible. It has certain advantages over green sand foundry practices in that a high degree of mechanization using unskilled labor is possible, it is a clean process, and the castings are clean-cut and accurate, with sharp details. Overly enthusiastic persons have sometimes referred to shell molding as a precision casting process; what they really mean is that once an item is in production, phenomenal duplication is possible.

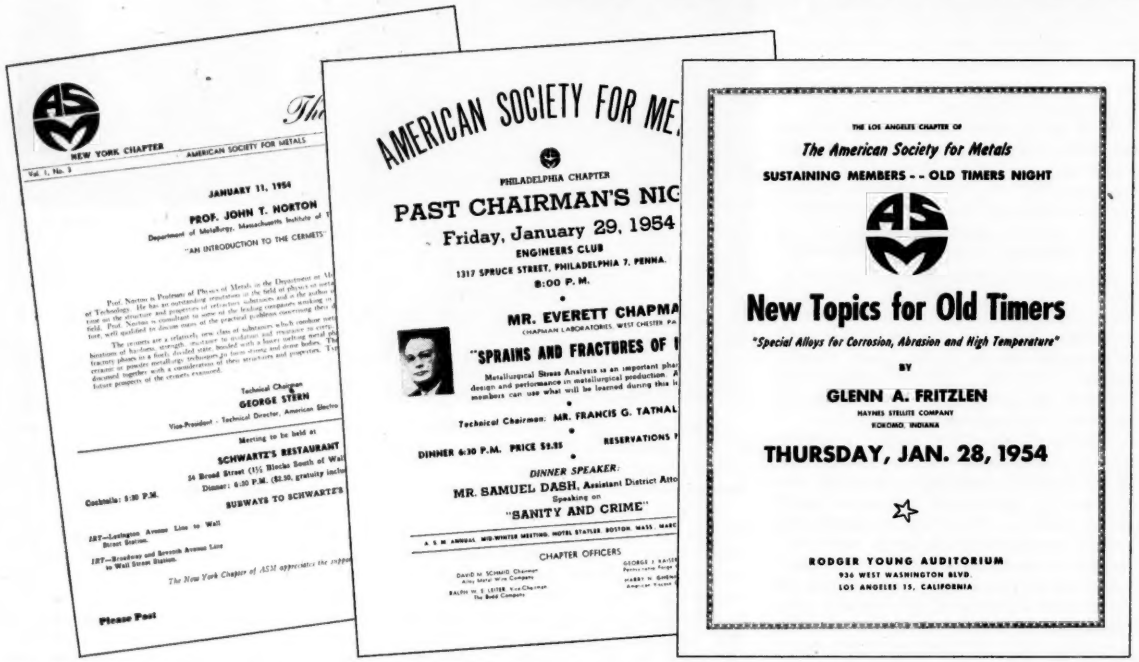
A major difference between shell molding and green sand molding that has caused some trouble for foundrymen is that shell molds are capable of considerable difference in dimensions due to thermal expansion. By virtue of the molding process, shell molds are more dense, use no fillers and the sand particles are adjacent to one another. In green sand molds, when the metal is poured, the water evaporates and the silica particles expand into space provided for by shrinkage of the clay. In a shell mold conditions are different. Due to the absence of moisture, insulation is excellent, heat transfer is low and the metal is not cooled as quickly. The phenolic resins start to decompose almost at once at the face and the decomposition occurs rapidly in the presence of oxygen. Decomposition of the resin causes the formation of carbon bonds which hold the sand particles in position, but no voids are formed which would absorb the expansion of the silica. Over-all dimensional changes on the order of 0.0012 in. per in. are present at molten iron temperatures.

If this expansion is properly anticipated, such faults as rough castings, cracking and shrinkage defects will be avoided and good surface will result if the metal solidification occurs in full contact with the mold.

At the present time some shell molding is on a par with green sand molding costwise, but with superior castings as an end product. In general the cost is higher, principally due to resin cost. There is very little chance of resin prices going down but considerable work is being done to reduce the amount of binder necessary to do the job.

The future of shell molding looks excellent. With expected development of coated sands, uniform molds will result in better, cheaper molds than now possible with green sand. Shell molding is still an infant—with a long life expectancy.—**Reported by D. C. Heckard for Dayton.**

Meeting Program Award Winners



NEW YORK CHAPTER — AMERICAN SOCIETY FOR METALS

JANUARY 11, 1954

PROF. JOHN T. NORTON

Department of Metallurgy, Massachusetts Institute of

"AN INTRODUCTION TO THE CERMETS"

Technical Chairman

GEORGE STERN

Vice-President - Technical Director, American Electro

Meeting to be held at

SCHWARTZ'S RESTAURANT

Please Post

AMERICAN SOCIETY FOR ME

PHILADELPHIA CHAPTER

PAST CHAIRMAN'S NIG

Friday, January 29, 1954

ENGINEERS CLUB

1317 SPRUCE STREET, PHILADELPHIA 7, PENNA.

8:00 P. M.

MR. EVERETT CHAPMA

CHAPMAN LABORATORIES, WEST CHESTER PA.

"SPRAINS AND FRACTURES OF

Technical Chairman: MR. FRANCIS G. TATNAL

DINNER 6:30 P.M. PRICE $3.25

RESERVATIONS

DINNER SPEAKER:

MR. SAMUEL DASH, Assistant District Atto

Speaking on

"SANITY AND CRIME"

CHAPTER OFFICERS

THE LOS ANGELES CHAPTER OF

The American Society for Metals

SUSTAINING MEMBERS - - OLD TIMERS NIGHT

New Topics for Old Timers

"Special Alloys for Corrosion, Abrasion and High Temperature"

BY

GLENN A. FRITZLEN

HAYNES STELLITE COMPANY

KOKOMO, INDIANA

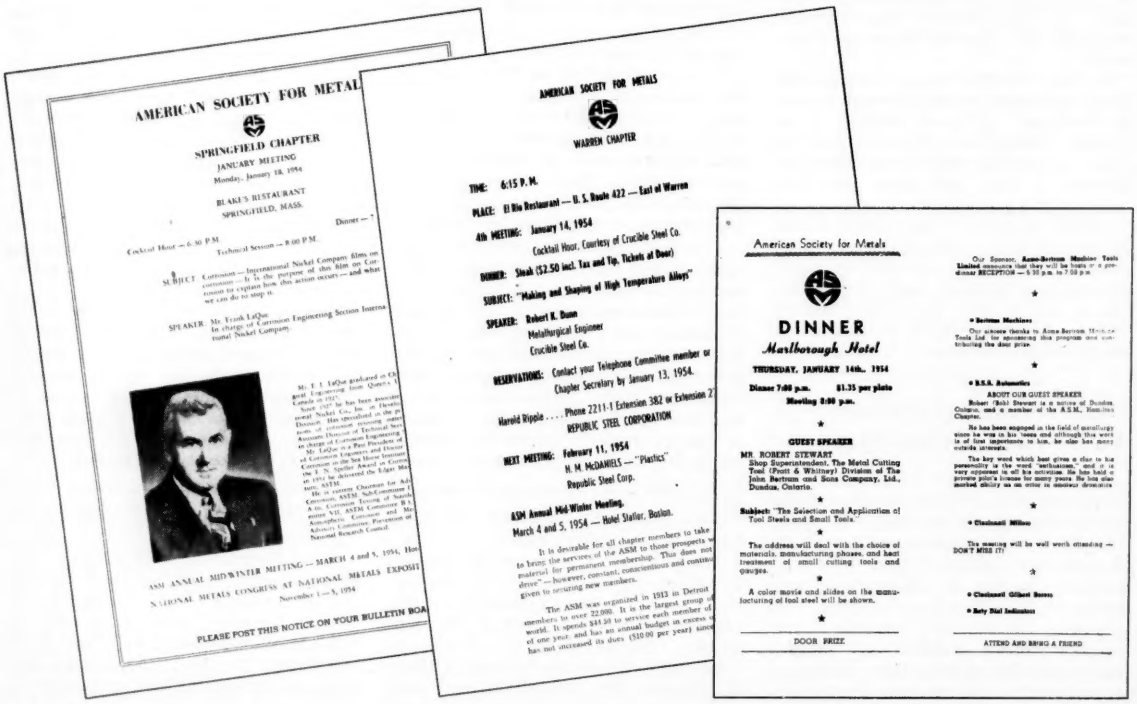
THURSDAY, JAN. 28, 1954

RODGER YOUNG AUDITORIUM

936 WEST WASHINGTON BLVD.

LOS ANGELES 15, CALIFORNIA

The Meeting Program Awards for January Notices Were Given to the New York, Philadelphia and Los Angeles Chapters for First, Second and Third Prizes, Respectively, in the Awards to Chapters With Over 500 Members, and to the Springfield, Warren and Manitoba Chapters for Awards to Chapters With Less Than 500 Members. Cash awards of $25, $15 and $10 have been sent out to the winners in each class



AMERICAN SOCIETY FOR METAL

SPRINGFIELD CHAPTER

JANUARY MEETING

Monday, January 18, 1954

BLAKE'S RESTAURANT

SPRINGFIELD, MASS.

Dinner — 7

Cocktail Hour — 6:30 P.M. Technical Session — 8:00 P.M.

SUBJECT Corrosion — International Nickel Company films on corrosion — It is the purpose of this film on Cor- rosion to explain how this action occurs — and what we can do to stop it.

SPEAKER Mr. Frank LaQue

In charge of Corrosion Engineering Section Interna tional Nickel Company.

PLEASE POST THIS NOTICE ON YOUR BULLETIN BOA

AMERICAN SOCIETY FOR METALS

WARREN CHAPTER

TIME: 6:15 P. M.

PLACE: El Rio Restaurant — U. S. Route 422 — East of Warren

4th MEETING: January 14, 1954

Cocktail Hour, Courtesy of Crucible Steel Co.

DINNER: Steak ($2.50 incl. Tax and Tip, Tickets at Door)

SUBJECT: "Making and Shaping of High Temperature Alloys"

SPEAKER: Robert K. Dunn

Metallurgical Engineer

Crucible Steel Co.

RESERVATIONS: Contact your Telephone Committee member or Chapter Secretary by January 13, 1954.

Harold Ripple .... Phone 2211-1 Extension 382 or Extension 2

REPUBLIC STEEL CORPORATION

NEXT MEETING: February 11, 1954

H. M. McDANIELS — "Plastics"

Republic Steel Corp.

ASM Annual Mid-Winter Meeting,

March 4 and 5, 1954 — Hotel Statler, Boston.

American Society for Metals

DINNER

Marlborough Hotel

THURSDAY, JANUARY 14th., 1954

Dinner 7:00 p.m. $1.35 per plate

Meeting 8:00 p.m.

GUEST SPEAKER

MR. ROBERT STEWART

Shop Superintendent, The Metal Cutting Tool (Pratt & Whitney) Division of The John Bertram and Sons Company, Ltd., Dundas, Ontario.

Subject: The Selection and Application of Tool Steels and Small Tools.

The address will deal with the choice of materials, manufacturing phases, and heat treatment of small cutting tools and gauges.

A color movie and slides on the manufacturing of tool steel will be shown.

DOOR PRIZE

Our Sponsor, Acme-Bertram Machine Tools Limited announce that they will be hosts at a pre-dinner RECEPTION — 6:30 p.m. to 7:00 p.m.

• Bertram Machines

Our sincere thanks to Acme-Bertram Machine Tools Ltd. for sponsoring this program and contributing the door prize.

• B.S.A. Automatics

ABOUT OUR GUEST SPEAKER

Robert (Bob) Stewart is a native of Dundas, Ontario, and a member of the A.S.M., Hamilton Chapter.

He has been engaged in the field of metallurgy since he was in his teens and although this work is of less importance to him, he also has many outside interests.

The boy word which best gives a clue to his personality is the word "enthusiasm," and it is very apparent in all his activities. He has held a private pilot's license for many years. He has also worked ably as an actor in amateur dramatics

• Cincinnati Milacron

The meeting will be well worth attending — DON'T MISS IT!

• Cincinnati Gilbert Bores

• Baty Dial Indicators

ATTEND AND BRING A FRIEND

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Akron	May 19	Mayflower Hotel	R. J. McWaters	Metallizing—A Useful Industrial Tool
Baltimore	May 17	Engineers' Club	R. H. Heyer	Cold Forming and Deep Drawing of Iron and Steel Sheets
Boston	May 7	Hotel Shelton	J. Y. Riedel	Improving Production From Tools and Dies
British Columbia	May			Annual Meeting, Golf and Dinner
Buffalo	May 22	Edgewater Park Hotel		Annual Meeting and Clambake
Calumet	May 11	Phil Smidt's	B. Morrison	Stainless Steel
Canton-Massillon	May 4	Mergus Restaurant	F. G. Tatnall	Is Testing Necessary?
Cedar Rapids	May 11	Roosevelt Hotel		Election of Officers and Stag
Chattanooga	May 18	Maypole Restaurant	E. E. Stanbury	New Aspects of Heat Treating
Cincinnati	May 13	Terrace Park Cty. Club		Annual Outing and Elections
Cleveland	May 10	Hollenden Hotel	E. H. Danneberger	Your Life and Man-Made Fibers
Columbia Basin	May 8			Annual Spring Dance
Dayton	May 12	Engineers' Club		Annual Business Meeting
Detroit	May 10	Rackham Memorial Bldg.	W. T. Bean, Jr.	Stress Analysis and the Metallurgist
Eastern N. Y.	May 12	Edison Club	H. B. Knowlton	Iron, Steel and the History of the World
Fort Wayne	May 22	Elk's Country Club		Spring Social Meeting
Georgia	May 3	Atlantic Steel Co.		Southeast Metalworking Man of the Year Award
Golden Gate	May 12	Pittsburg, Calif.		Plant Visit-Columbia-Geneva Steel Co.
Hartford	May 11	Indian Hills Cty. Club	J. B. Austin	Metals of the Future
Indianapolis	May 17	McClarney's Restaurant	W. L. Grube	Electron Metallography
Jacksonville	May 10	Seminole Hotel	D. T. Black	Magnesium Metals in Military Aircraft
Los Alamos	May 17		T. F. McCormick	Extrusion of Metals
Los Angeles	May 27	Rodger Young Audit.		Annual Election of Officers
Louisville	May 11	River Road Country Club		Ladies Night
Mahoning Valley	May 11	United Eng. & Fdy. Co.		Plant Visit
Milwaukee	May 7	North Hill Cty. Club		Annual Party
Minnesota	May 20	Covered Wagon	G. A. Fritzlen	Hard Facing Materials
Montreal	May 3	Queen's Hotel		Annual Meeting, Ladies and Past Chairmen's Night
New Haven	May 20	Hotel Taft	Fred Olsen	Evaluation of Research
New Jersey	May 17	Essex House	Norman Mochel	Wyzalek Memorial Night-The Gas Turbine
New Orleans	May 5	Country Club	H. P. Rassbach	Effect and use of Alloys in Steel
New York	May 10	Schwartz's Restaurant	W. G. Pfann	Transistors and Semiconductors
Northwestern Pennsylvania	May 20	G. E. Center		Ladies Night
Notre Dame	May 12	Engineering Bldg.	A. H. Pickford	Application of Experimental Stress Analysis to Machine Development
Oak Ridge	May 12	S & W Cafeteria, Knoxville	E. F. Nippes	Effect of Weld Thermal Cycles on Corrosion Resistance of Type-347 Stainless Steel
Ontario	May 7	Toronto		Stump the Experts Night
Ottawa Valley	May 4	Murphy-Gambles		Ladies Night
Penn State	May 11	Electrical Eng. Bldg.	E. S. Rowland	Selection of Steels
Peoria	May 10	New American Legion Bldg.	E. H. Dix, Jr.	Aluminum
Philadelphia	May 13	Engineers' Club	Alfred Borneman	The Tin Pest
Philadelphia—Jr. Section	May 13	Engineers' Club		Joint Meeting With Senior Chapter
Pittsburgh	May 13	Ft. Pitt Hotel	M. W. Lightner	Pittsburgh Night
Purdue	May 18	Lincoln Lodge		Annual Meeting
Rochester	May 10	Elks Club		Annual Meeting
Rocky Mountain	May 20	Oxford Hotel		National Officers Night
Rhode Island	May 14	Biltmore Hotel		Host-New England Regional Conference
St. Louis	May 21	DeSoto Hotel	J. B. Austin	Metals of Tomorrow
Saginaw Valley	May			Ladies Night-Dinner Dance
Savannah River	May 13	Commercial Hotel	F. M. Rhines	Aluminum
Springfield	May 17	Blake's Restaurant		Film—How Steel Is Made
Syracuse	May 15	Hinderwadel's		Annual Clambake
Texas	May 4	Ben Milam Hotel	E. Van Hambach	Fabrication of Stainless Steels
Tri-City	May 6	Rock Island Arsenal	F. G. Foote	Metallurgical Aspects of the Atomic Energy Program
Tulsa	May 4	Michaelis Cafeteria	H. B. Osborn, Jr.	Induction Heating
Utah	May 21	Fort Douglas		May Festival
Warren	May 13	El Rio Restaurant	A. G. Cook	Hot Extrusion of Stainless Steel
Washington	May 10	Naylor's Restaurant	A. O. Schaefer	Heavy Forgings
Western Ontario	May 14	Mario's Tavern, Windsor	G. Dean Fry	Die Casting
West Michigan	May 17	Lock's Restaurant	G. A. Roberts	National Officers Night
Wichita	May 18	K. of C. Hall	J. B. Austin	National Officers Night
York	May 12	Gettysburg, Pa.	E. Bishop	Spark Testing

Meet Your Chapter Chairman

G. H. Enzian

D. Girardi

K. H. Mairs

PITTSBURGH

GEORGE H. ENZIAN was born in Forty Fort, Pa. He received a B.S. degree from Lehigh University in 1935, and a metallurgical engineering degree in 1942. Mr. Enzian has been with Jones and Laughlin Steel Corp. since 1935, at which time he was employed as metallurgical inspector in the Pittsburgh Works Division. In 1937 he was transferred to the Research and Development Division as research metallographer. Five years later he advanced to the position of head of the metallurgy and testing section. From 1949-1953 he was assistant manager, Metallurgical Research Division, and at the present time is manager of that division.

Being an active member of the A.S.M., he has held a position on the Executive Committee of the Pittsburgh Chapter and was elected treasurer and vice-chairman of the Chapter in 1951 and 1952 respectively. He is also an active member of A.I.M.E., A.S.T.M. and A.W.S. From 1947-49 he held the position of treasurer of the Pittsburgh Section of the A.I.M.E. and from 1949-51 was secretary.

In the spring of 1951, he attended the University of Pittsburgh to study "Management Problems for Executives".

When not occupied by his two young daughters, Mr. Enzian enjoys hunting, fishing, gardening or golf.

WICHITA

L. G. MONTRE was born in Baltimore, Md., in 1908, and attended Baltimore City College, graduating in 1926, and Johns Hopkins University for three years. His first job was at the Baltimore Copper Smelting and Rolling Co. as a metallurgist. This was followed six years later by a job as metallurgist at the Rustless Iron and Steel Corp., now Armco-Rustless Division. During World War II he was chief inspector for the Baltimore Regional Office of the Philadelphia Ordnance District, and he spent four years as quality control manager in can manufacturing. In 1949 he became associated with the O. A. Sutton, Corp., in Wichita, as quality control manager.

Mr. Montre was married in 1929 to Alyce Schulte and they have two sons, Bill, a junior in high school, and Bob, Jr., a junior at Kansas State College. He is a senior member of the American Society for Quality Control, and a member of the Rocky Mountain Federation of Minerological Societies. In 1953 he was appointed to the A.S.M. National Constitution and By-Laws Committee.

Strangely enough for a Kansan, his principal hobby is salt water fishing. Other hobbies more often followed are mineral collecting and cooking.

CANTON-MASSILLON

DAN GIRARDI, research metallurgical engineer, Timken Roller Bearing Co., was born in Canada. He received a B.S.E. degree in chemical engineering from Wayne University and M.S.E. and Ph.D. degrees in metallurgical engineering from the University of Michigan. His first job out of school was in the metallurgy department of the University of Wisconsin as a teacher, and he has been a metallurgist with the Dow Chemical Co., and chief metallurgist with the Garfield Division, Houdaille-Hershey, Manhattan Project.

Dan is single. He is a member of A.I.M.E. and Sigma Xi, and his hobbies are golf and photography.

RHODE ISLAND

KENNETH H. MAIRS, associate professor of metallurgy at the University of Rhode Island, was born in Norristown, Pa. He received B.S., M.S. and Met. E. degrees from Pennsylvania State College, the last in 1950. The first job he took after college was as research metallurgist with the Radio Corp. of America doing development work on the metal vacuum tube. He later filled positions as supervising metallurgist and chief chemist for the U. S. Naval Torpedo Station, Newport, R. I., and was at Mellon Institute in Pittsburgh on the Grinding Wheel Fellowship for a short time.

Ken, his wife and two children have just about completed building their own six-room house. His hobbies includes salt water swimming, recorded music and woodworking, and he is the tournament director of the University of Rhode Island's bridge groups. Ken served on the educational committee of the Rhode Island Chapter for several years.

MUNCIE

CHARLES W. HOOVER, metallurgical laboratory supervisor, Perfect Circle Corp., was born in Huntington County, Ind. In 1943 he graduated from Indiana University where he was a chemistry major. He played basketball and softball at high school. His first job was as a chemist for the Chrysler Corp., and he worked for a while as a melting supervisor before coming to his present job.

Charles is married and has a daughter, Diana Lynn, 4½, and a son, Larry, 4 months old. He is a Sunday School teacher and usher in the Methodist Church and a past member of the Junior Chamber of Commerce, and served in the State Guard for one year. His hobbies are golf, basketball and woodworking.

NEW HAVEN

RALPH P. NEVERS, head of the central laboratory of American Brass Co., was born in Peabody, Mass., and received his primary education in Salem, Mass. He graduated from the University of New Hampshire, where he participated in both football and track. His first job was as a chemist and he has held various jobs as chemist and metallurgist prior to his present position.

Ralph has two daughters and four grandsons. He is a Mason, a World War I veteran and past-commander of the local American Legion post. He has served on several committees and offices of his Chapter.

L. G. Montre

R. P. Nevers

C. W. Hoover

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad Received During the Past Month

Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio

Stewart J. Stockett, Technical Abstracter

Assisted by Fred Body, Ardeth Holmes, Mildred Landon and Members of the Translation Group

A
General Metallurgical

89-A. Correlation of Metallurgy With Engineering Design. R. C. Gibbons. *American Society of Tool Engineers, Technical Papers and Panel Discussion,* v. 21, 1953, 10 p.

Discussion on strength of alloys, rigidity, machinability and basic metal-forming processes. Photographs, drawings. (A general, Q general, G general)

90-A. Metals. *Engineering and Mining Journal,* v. 155, Feb. 1954, p. 72-91, 134, 136, 138.

Includes "Gold", M. A. Kriz; "Silver", Francis H. Wemple; "Copper", H. H. Wanders; "Lead", Robert L. Ziegfeld; "Zinc", Charles R. Ince; "Uranium", Donald L. Everhart; "Titanium", Alfred F. Tumin; "Aluminum", Irving Lipkowitz; "Magnesium", J. D. Hanawalt; and "Tin", H. H. Wanders. Graphs, tables, maps. (A general, Au, Ag, Cu, Pb, Zn, U, Ti, Al, Mg, Sn)

91-A. Minor Metals. Charles White Merrill. *Engineering and Mining Journal,* v. 155, Feb. 1954, p. 92-96, 133.

Includes "Antimony", Abbott Renick; "Beryllium", Robert F. Griffith; "Mercury", Helena M. Meyer; "Arsenic", Abbott Renick; "Bismuth", Abbott Renick; "Cadmium", Robert L. Mentch; and "Platinum Group", James E. Bell. Tables, diagrams. (A general, Sb, Be, Hg, As, Bi, Cd, Pt)

92-A. Ferro-Alloy Metals, Norwood B. Melcher. *Engineering and Mining Journal,* v. 155, Feb. 1954, p. 97-102.

Includes "Tungsten", Robert W. Geehan; "Molybdenum", Robert W. Geehan; "Manganese", Gilbert L. DeHuff, Jr.; "Cobalt", Hubert W. Davis; "Nickel", Hubert W. Davis; and "Chromium", Charles Katlin. Tables. (A general, W, Mo, Mn, Co, Ni, Cr, Fe-n)

93-A. Still More Steel Expansion Coming as the Population Climbs; 1953's 6.8-Million-Ton Gain Is Just One Step Along the Way. *Steel,* v. 134, Feb. 8, 1954, p. 78-79.

Data sheet of steelmaking capacity. (A4, D general, ST)

94-A. (Czech.) Economic Control of Alloyed Steel Manufacture. V. Keclik. *Hutnické Listy,* v. 9, no. 1, Jan. 1954, p. 24-32.

Comparison of basic melting methods. Shows expenditures for melting steel from cold charged metal in various furnaces. Tables. 8 ref. (A4, D general, AY)

95-A. Dust Control. *Iron & Steel,* v. 27, Feb. 1954, p. 42.

Reports BCIRA model extractor now available. Design, construction and applications. Drawing. (A5)

96-A. Magnesium in Britain—1954 and the Future. C. J. P. Ball. *Light Metals,* v. 17, Feb. 1954, p. 42-43.

English efforts to achieve production of low-cost magnesium products. Compares progress with that of the U. S. Graph. (A4, Mg)

97-A. Contribution of Industrial Metrology and High Precision Mechanics to the Elimination of Scrap. *Microtecnic (English Ed.),* v. 7, no. 6, 1953, p. 273-366.

Consists of "The Works Manager and the Problem of Scrap", André Léauté; "The Engineer and the Problem of Scrap", P. Nicolau; "The User's Point of View", Raison and Chapon; "The Manufacturer's Point of View", R. Masse and Maugras; "The Contribution of Copying to Precision Turning", Le Lan; "Recent Progress in Centreless Grinding", W. Loewe; "Inspection, the Guardian of Quality", G. Langendorff; "Automatic Inspection as a Means of Reducing Costs and Improving Quality", Romano; "Metrology Associated With the Machine Tool", Yribarren; "Results Obtained by Using Gauging Instruments of the Sonic Flow Type on Machine Tools", A. Fortier. Tables, photographs, graphs, diagrams. (A8)

98-A. World Trends in Iron and Steel Industry. *South African Mining and Engineering Journal,* v. 64, pt. 2, Dec. 26, 1953, p. 631, 633.

Changes in industry from 1929 to 1952, growing output and increased use of scrap. Tables. (A4, ST)

99-A. The Search for New Alloys. G. L. Bailey. *Times Review of Industry (Supplement),* 1954, p. 35-36, 39.

Nonferrous metals are in greater demand than ever before to meet changing requirements of modern engineering and manufacturing methods. Photographs. (A general)

100-A. (Dutch.) The Industrial Electric Furnace. An Outline of the Forms of Development of Importance to Dutch Industry. J. J. M. Roos. *Smit Mededelingen,* v. 8, no. 4, Oct.-Dec. 1953, p. 122-137.

Resistance, induction, di-electric and electric-arc heating. Photographs. (A general, J general)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

101-A. Growth Possibilities of Electric Furnace Carbon Steel. Willard C. Wheeler. *Iron and Steel Engineer,* v. 31, Feb. 1954, p. 85-92; disc., p. 92-94.

Attempts to predict future increases in production based on past performance of other industries. Graphs. (A4, ST, AY)

102-A. Kaiser Steel Corporation's Fontana Plant. T. J. Ess. *Iron and Steel Engineer,* v. 31, Feb. 1954, p. K1-K20.

Raw materials, coke ovens, blast and openhearth furnaces, blooming, structural, plate and strip, tinplate, skelp and merchant and pipe mills and cold reduction facilities. Plant layout, diagrams, photographs, tables. (A5, D general, F general, ST)

103-A. Norway's Metal Industries. *Metal Age,* 1954, no. 26, Feb., p. 3-6.

Production of ferro-alloys, aluminum, copper, nickel and zinc. Map, table. (A4, AY, Al, Cu, Ni, Zn)

104-A. Zinc Industry Cannot Afford to be Complacent About Present Market Demand for Its Products. R. G. Kenly. *Metals (Daily Metal Reporter Monthly Supplement),* v. 24, Feb. 1954, p. 7-8, 19.

Metal's use in rubber, paint, brass, die casting and galvanizing fields may decline somewhat in 1954 but will stay at high levels. (A4, Zn)

105-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 21, Feb. 1954, p. 83-90.

From "lattens" to "Lipowitz's alloys". Diagrams, tables. (To be continued.) (A10)

106-A. Copper Consumption Rate Is Well Maintained in U. K. and Europe; Consumers' Stocks Not Large. L. H. Tarring. *Metals (Daily Metal Reporter Monthly Supplement),* v. 24, Feb. 1954, p. 12-13.

Economic outlook for British metal market. (A4, Cu)

107-A. U. S. Copper Output Curtailed as Demand Eases While Zinc and Lead Production Drops Further. *Metals (Daily Metal Reporter Monthly Supplement),* v. 24, Feb. 1954, p. 15-16, 19.

Economic trends in domestic metal industries. (A4, Cu, Zn, Pb)

108-A. Stable Silver Price Anticipated During 1954; Users Will Be More Dependent on New Sources. Handy & Harmon. *Metals (Daily Metal Reporter Monthly Supplement),* v. 24, Feb. 1954, p. 9-11, 19. (Excerpts from 38th Annual Review of Silver Market, 1953. Handy & Harmon, New York, N. Y.)

Economic outlook for silver industry. Tables. (A4, Ag)

109-A. Metals, Minerals and Alloys. *Mining Journal,* v. 242, Feb. 12, 1954, p. 185-186.

Economic position of various metals and their production tendencies. Table. (A4, Fe, Ti, Mg, Al, Zn, Pb, Cu)

110-A. Nonferrous Metals. *Steel,* v. 134, Mar. 1, 1954, p. 154.

Economic discussion on competition of imported brass with local sources. (A4, Cu)

111-A. (Hungarian.) **Electric Gas Cleaning.** Karoly Horvath. *Elektrotechnika,* v. 47, no. 1, Jan. 1954, p. 21-28.

Principles of operation and construction. Dust cleaners for powder stations, coal dust separators, generator gas cleaners and cleaning plants for cement factories and metallurgical works. Diagrams, graphs, tables. (A5, A8)

112-A. (Book.) **Conference on Nuclear Engineering, 1953, Proceedings.** Sections individually paged. Sept. 9-11, 1953. Univ. of Calif., Berkeley, Calif. $7.50.

A high-level technical program of contributed, unclassified, and declassified papers for persons concerned with beneficial applications of atomic energy. (A general)

113-A. (Book—German.) **(Textbook on General Metallurgy.) Lehrbuch der Allgemeinen Metallkunde.** Georg Masing. 620 p. 1950. Springer-Verlag, Berlin, Germany.

General principles; constitution theory; atomic structure of metallic crystals; diffusion; formation of crystalline metals; physical properties of metals; plastic deformation; internal stresses; recovery and recrystallization; phase changes in crystalline metals; and chemical reactivity of metals with nonmetallic substances. (A general, M general, N general)

B
Raw Materials and Ore Preparation

110-B. Ore Dressing. Bunting S. Crocker. *Engineering and Mining Journal,* v. 155, Feb. 1954, p. 120-122, 132-133.

Reports industry interest centers on hydrometallurgy. (B14)

111-B. Iron Ore Beneficiation. Fred D. DeVaney. *Engineering and Mining Journal,* v. 155, Feb. 1954, p. 123-125.

Taconite projects in Lake Superior region. (B14, B15, B16, Fe)

112-B. Metallurgy. A. W. Schlecten. *Engineering and Mining Journal,* v. 155, Feb. 1954, p. 126-128.

Review of 1953 literature which explains extractive processes in terms of fundamental reactions and relations.

(B general, C general, D general)

113-B. Properties of Foreign and Domestic Natural Graphites. *National Bureau of Standards, Technical News Bulletin,* v. 38, Jan. 1954, p. 5-6.

Chemical composition, thermal reactions, surface area and refractoriness of ash were determined to establish suitability for use as crucibles in nonferrous refining. Diagrams. (B19)

114-B. Progress in the Development of Refractories for Steel Manufacture. J. H. Chesters. Paper from "Ceramics. A Symposium". The British Ceramic Society, p. 637-650 + 4 plates.

Refractories of fireclay, silica, dolomite, magnesia and chrome. Photographs. 18 ref.
(B19, D general, ST)

115-B. (German.) **Study on the Process of Phase Separation of the Graphite-Mineral-Water-Oil System.** E. Weingaertner and T. K. Ghose. *Erdöl und Kohle,* v. 6, no. 12, Dec. 1953, p. 776-783.

Laws which govern Trent process of separating two or more solids by using their differential "wetting affinities" for two immiscible liquid phases. Experiments. Tables, graphs, photographs. 9 ref. (B14)

116-B. Beneficiation of Low Grade Saskatchewan Uranium Ores. I. J. O. Korchinski, G. A. Craig, S. D. Cavers and A. B. Van Cleave. *Chemistry in Canada,* v. 6, Feb. 1954, p. 34-39.

Based on paper presented to Chemical Engineering Division, Chemical Institute of Canada, 36th Annual Conference, Windsor, June 1953. Equipment, materials and methods. Map, diagram, photograph, graphs, tables. 12 ref.
(B14, U)

117-B. Preparation of Ores. J. M. McLeod. *Iron & Steel,* v. 27, Feb. 1954, p. 49-54.

Methods of improvement of blast furnace burdens. 56 ref.
(B14, B16, D1, Fe)

118-B. Chromium Distribution Between Liquid Iron and Molten Basic Slags. Nicholas J. Grant, Earl C. Roberts and John Chipman. *Journal of Metals,* v. 6, Feb. 1954, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Feb. 1954, p. 145-149.

Study of distribution of chromium and oxygen between liquid iron, containing less than 1% chromium, and simple slags in temperature range 1526 to 1734° C. Graphs, photomicrographs, table. 15 ref.
(B21, Fe)

119-B. Aluminium in the British Commonwealth. *Light Metals,* v. 17, Feb. 1954, p. 39-42.

Resources and developments in power, bauxite and metal in British Isles, Canada, Africa, India and Australia. Maps. 3 ref. (B10, Al)

120-B. Grades of Lake Superior Region Iron Ore Shipped by Lake Vessel, Season 1953. *Skillings' Mining Review,* v. 42, Feb. 13, 1954, p. 1-2.

Iron ore grades and gross output. Photograph, tables. (B10)

121-B. Iron Ore to Be Recovered From Nickel Ores. *INCO,* v. 26, no. 3, p. 7-8.

New process will ultimately yield 1,000,000 tons of high-grade ore per year. Photograph.
(B general, Fe, Ni)

122-B. Developments in Minerals Beneficiation. Donald W. Scott. *Mining Engineering,* v. 6, Feb. 1954, p. 166-183.

Progress in fields of crushing and grinding, screening and classification, solids-fluids separation, flotation, solution and precipitation, agglomeration and sintering. Photographs. (B14)

123-B. Flotation Characteristics of Pyrrhotite With Xanthates. C. S. Chang, Strathmore R. B. Cooke and Iwao Iwasaki. *Mining Engineering,* v. 6; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 199, Feb. 1954, p. 209-217.

Effects of aeration on an aqueous suspension of pyrrhotite. Results correlated with flotation tests using xanthates as collectors. Effects of copper activation and pH variation and possible mechanisms. Graphs, micrographs, tables. 19 ref.
(B14, Fe)

124-B. Flotation Theory. Molecular Interactions Between Frothers and Collectors at Solid-Liquid-Air Interfaces. J. Leja and J. H. Schulman. *Mining Engineering,* v. 6; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 199, Feb. 1954, p. 221-228.

Long-chain homologs of alcohols and alkyl sulfates react strongly with xanthates at the air-liquid interface; reactions between frothers and collectors occur at the solid-liquid interface if the solid is suitably coated by collector molecules; and effects of collector-frother associations are evident in frothing and flotation tests. Diagrams, graphs, tables. 23 ref. (B14)

125-B. Transformation of Quartz in Presence of a Small Quantity of Mineralizers. I. S. Kainarskii and L. I. Karyakin. *Henry Brutcher, Altadena, Calif., Translation* no. 3190, 10 p. (From *Doklady Akademii Nauk SSSR,* v. 81, no. 5, 1951, p. 887-890.)

Microscopic study of silica brick made with iron bond and containing 98% silica after service in an openhearth furnace roof. Compares crystallization of the silica in this brick against ordinary silica brick. Table, micrographs. 3 ref. (B19)

126-B. (English.) **Diffusion of Sulfur in Molten CaO-SiO_2-Al_2O_3 Slag.** Tunezo Saito and Yasuji Kawai. *Science Reports of the Research Institutes, Tohoku University,* Series A, v. 5, no. 5, Oct. 1953, p. 460-468.

As a first step in the study of kinetics of desulfurization of iron by slag, rate of diffusion of sulfur was determined by use of radioactive sulfur-35. Diffusion coefficient in an acid slag at 1440° C. was nearly the same as in a basic slag. Diagrams, graphs, tables. 3 ref. (B21, N1)

127-B. (Portuguese.) **Microstructures Observed in Sinters From the Monlevade (Brazil) Factory.** Janusz Wscieklica. *ABM (Boletim da associacao brasileira de metais),* v. 9, no. 32, July 1953, p. 332-343.

Semi self-fluxing and self-fluxing sinter data. Relationship between microstructure and quality of these two types of sinter. Table, micrographs. 5 ref. (B16, M27, Fe)

128-B. (Book.) **Ceramics. A Symposium.** A. T. Green and Gerald H. Stewart, editors. 877 p. 1953. The British Ceramic Society, Stoke-on-Trent, Staffordshire, England. £2/5.

Twenty-nine contributions, individually abstracted, grouped according to their range of interest under four principal headings.
(B19, L27, H12)

C
Nonferrous Extraction and Refining

53-C. The Free World's Nickel Refining Troubles. *Mining Journal,* v. 242, Jan. 29, 1954, p. 124-125.

Reviews history of nickel industry. Predicts erection of nickel refining facilities, both on North American Continent and in Cuba, tailored to suit requirements of individual deposits. (C general, Ni)

54-C. (German.) **Preparation and Constitution of Copper-Boron Alloys.** F. Lihl and O. Feischl. *Metall,* v. 8, nos. 1-2, Jan. 1954, p. 11-19.

Various methods of preparing alloys. Thermal analysis, hardness and conductivity measurements, iso-

lation and analysis of the boride as a means of studying structure of the alloys. Micrographs, tables, graphs. 7 ref.
(C general, M23, Q29, P15, Cu, B)

55-C. (German.) **Deoxidizing of Lead.** W. W. Krysko. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 6, no. 11, Nov. 1953, p. 442-445.
Solubility of oxygen in lead. Experiments for development method for eliminating oxygen from lead by means of aluminum additions. Advantages of process. Photographs. 12 ref. (C21, P13, Pb)

56-C. (German.) **Separation of Chemically Pure Vanadium From the Gaseous Phase.** G. Jantsch and F. Zemek. *Monatshefte für Chemie,* v. 84, no. 6, Dec. 15, 1953, p. 1119-1126.
Reduction of vanadium tetrachloride with pure hydrogen. Diagrams, micrographs, spectrograph. 22 ref. (C2, V)

57-C. (German.) **Continuous Process of Lead Refining in the Oker Lead-Copper Smelter.** Jürgen Feiser, Helmut Börger and Georg Krahn. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 7, no. 1, Jan. 1954, p. 1-3.
Modification of continuous refining at Port Pirie, Australia, to compensate for low production at Oker. Furnace arrangement. Diagrams. 4 ref. (C21, Pb)

58-C. (German.) **Recent Developments in the Field of Sinter Roasting, Their Importance to the Smelting of Lead Ores.** Helmut Wendeborn. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 7, no. 1, Jan. 1954, p. 3-11; disc., p. 11.
Direct process of extracting lead from lead-rich concentrates; advantages of compressed-air sintering. Diagrams, photographs, tables, graphs. 7 ref. (C21, B16, Pb)

59-C. (German.) **The New Roasting Plant in the Neivenheim Zinc Smelter of the Stolberg Zinc AG.** Reinhard Fischer. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 7, no. 1, Jan. 1954, p. 11-14.
Plant arrangement. Discusses pelleting apparatus and a multiple-tier roasting furnace. Diagram, photographs. (C21, B15, Zn)

60-C. (German.) **Microscopic Investigations of Segregation Processes in Slag Melting.** Sven Lundqvist. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 7, no. 1, Jan. 1954, p. 14-17.
Metallographic studies of slags on copper matte melts at usual temperatures reveal that these slags may segregate magnetite due to low rate of magnetite solution in the melt. Photomicrographs. 11 ref.
(C21, B21, M27, Cu)

61-C. (German.) **Smelting of Ilmenite.** Walter Schaller. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 7, no. 1, Jan. 1954, p. 18-22.
Shows that metallic iron can be extracted by smelting with sodium oxide at temperatures up to 1400° C. Graphs, tables, micrographs. 6 ref. (C21, Ti)

62-C. Reverberatory Furnaces for Melting Aluminum. *Canadian Metals,* v. 17, Feb. 1954, p. 18, 20.
Fast, economical method of melting aluminum with maintained quality. (C21, Al)

63-C. Molybdenum. *Iron Age,* v. 173, Feb. 18, 1954, p. 166-169.
Preparation of high-purity metal by electrolysis has been achieved by the National Bureau of Standards. Photographs. (C23, Mo)

64-C. (German.) **Discontinuous Freezing Processes in Continuous Casting of Raffinal or Pure Aluminum.** Dietrich Altenpohl. *Zeitschrift für Metallkunde,* v. 44, no. 11, Nov. 1953, p. 536-550.
Investigations revealed periodic liquations up to 15 mm. below casting skin formed by reheating of ingot surface. Pure aluminum showed highly variable etchability. Photographs, graphs, micrographs, diagrams, tables. 10 ref. (C5, Al)

65-C. Purifying Zinc by Distillation. *Canadian Chemical Processing,* v. 38, Feb. 1954, p. 34, 36.
Zinc dross and wastes recovered by distilling in special furnaces. Photographs. (C22, A8, Zn)

66-C. Titanium Production Expanding Rapidly. T. W. Lippert. *Industrial Heating,* v. 21, Feb. 1954, p. 272, 274, 280.
(C general, Ti)

67-C. Refining Molybdenum. *Steel,* v. 134, Mar. 1, 1954, p. 146-147.
Electrolytic preparation of this critical refractory metal has proved successful. (C23, Mo)

68-C. The Production of Antimony. Wayne D. Gould. *Western Miner and Oil Review,* v. 27, Feb. 1954, p. 42-43.
Procedure used in obtaining antimony from a copper-antimony-silver sulfide mineral. (C21, Sb)

69-C. Quantitative Study of Extraction of Titanium Dioxide From Ilmenite by Smelting. II. W. Freundlich. *Henry Brutcher, Altadena, Calif., Translation no.* 3120, 19 p. (From *Bulletin de la Société Chimique de France,* v. 19, no. 5, 1952, p. 496-501.)
Previously abstracted from original. See item 135-C, 1952.
(C4, Fe, Ti)

70-C. (French.) **Electrolytic Refining of Aluminum. I. Some Physiochemical Properties of Baths and Their Influence in Electrolysis of Aluminum. II. Secondary Formation of Aluminum. Thermodynamics of Reactions at the Electrodes. III. New Explanation of Anodic Effect by Considering the "Solvation" of Ions in Igneous Electrolysis of Aluminum. Possible Existence of Perfluorides at the Anode. IV. Is There a Relationship Between the Composition of Electrolysis Bases and the Faraday Efficiency? Origin of CO-Variation With Interpolar Distance.** E. Pruvot. *Alluminio,* v. 22, no. 6, Dec. 1953, 31 p.; disc., 7 p.
Includes tables, graphs, diagrams. 4 ref. (C23, Al)

71-C. (French.) **A New Method of Rapid Analysis of Baths Used in Electrolytic Production of Aluminum.** M. Fiquet and M. Armand. *Alluminio,* v. 22, no. 6, Dec. 1953, p. 621-628; disc., p. 628-630.
Suggests use of caustic soda to separate sample into two phases. Data from routine tests. Graphs, diagrams, table. (C23, Al)

72-C. (Italian.) **Classification of Baths by the Electrolysis of Al_2O_3 According to Phase Diagrams and Micrographic Analysis.** A. Vajna. *Alluminio,* v. 22, no. 6, Dec. 1953, p. 635-641; disc., p. 641-643.
Thermal analysis of cryolite base binary and ternary systems carried out with special equipment. Photographs, micrographs, diagrams, graphs. (C23, M24, Al)

73-C. (French.) **Electrolysis of Aluminum Chloride and the Chemicophysical Properties of Electrolytic Baths.** A. von Zeerleder. *Alluminio,* v. 22, no. 6, Dec. 1953, p. 655-660; disc., p. 661-662.
Various systems. Electrothermal reduction of siliceous bauxites in form of silico-aluminum and electrolytic refining. Tables, graphs, photographs, diagrams, map. 19 ref. (C23, Al)

74-C. (French.) **Considerations on the Power Balance of Electrolysis for Production of Aluminum.** R. Piontelli. *Alluminio,* v. 22, no. 6, Dec. 1953, p. 731-745; disc., p. 745-748.
Relation between composition of aluminum pot gases and current efficiency. Diagrams, tables. 11 ref. (C23, Al)

75-C. (German.) **Method of Obtaining Gallium From Commercial Aluminum Alloys.** Ekkehard Gastinger. *Berg- und hüttenmännische Monatshefte der montanistischen Hochschule in Leoben,* v. 99, no. 1, Jan. 1954, p. 13-16.
Problem of separating small quantities of gallium from large quantities of aluminum and iron. Tables, diagram. 14 ref. (C23, Ga, Al)

76-C. (Italian.) **Control of Voltage in Electrolysis of Aluminum.** J. Moravansky. *Alluminio,* v. 22, no. 6, Dec. 1953, p. 663-671.
Methods adopted in several factories, and method used at Ranshofen plant in Austria. Graphs, diagrams, photographs. (C23, Al)

77-C. (Italian.) **Measuring Cathodic Overvoltage in Electrolysis for Producing Aluminum.** R. Piontelli and G. Montanelli. *Alluminio,* v. 22, no. 6, Dec. 1953, p. 672-677; disc., p. 677-678.
Analysis of fused salt-bath method by means of reference electrode. Results. Diagrams, graphs, table. 16 ref. (C23, Al)

78-C. (Italian.) **Observations on the Interpretation of Processes for the Electrolysis of Aluminum.** Kai Grjotheim. *Alluminio,* v. 22, no. 6, Dec. 1953, p. 679-686; disc., p. 686-689.
Electrolytic reduction of alumina in molten cryolite baths. Graph, tables, diagrams. 14 ref. (C23, Al)

79-C. (Italian.) **Reactions Between Carbon Dioxide and Metallic Fog in the Alumina Electrolysis Cells.** R. Schadinger. *Alluminio,* v. 22, no. 6, Dec. 1953, p. 691-697; disc., p. 697.
Current efficiency shown to be between 85 and 90% in industrial conditions. Table, diagrams, graphs. 4 ref. (C23, Al)

80-C. (Italian.) **Current Efficiency in Electrolysis Cells in Relation to Specific Consumption of Coal and Power.** B. Panebianco. *Alluminio,* v. 22, no. 6, Dec. 1953, p. 718-720.
Current efficiency in a Söderberg type self-baking anode industrial cell. (C23, Al)

81-C. (Italian.) **Action of Magnetic Fields in Large Cells for Electrolysis of Aluminum.** R. Jötten. *Alluminio,* v. 22, no. 6, Dec. 1953, p. 751-758.
Advantages and disadvantages of large electrolytic cells. Diagrams, graphs. (C23, Al)

82-C. (Italian.) **Electromagnetic Forces in Large Cells for Aluminum Production.** J. Wleugel. *Alluminio,* v. 22, no. 6, Dec. 1953, p. 759-765; disc., p. 765-769.
Causes, action on furnace and possible methods of reducing the forces. Diagrams, graphs, photographs. (C23, Al)

83-C. (Italian.) **Present Work in the Field of the Production of Copper.** G. Porro. *Metallurgia italiana,* v. 45, no. 11, Nov. 1953, p. 405-424.
Ore treatment, extractive metallurgy, foundry practice with black and blister copper, refining of black copper and casting. Diagrams, graph. 7 ref. (C general, B general, Cu)

84-C. (Portuguese.) **Specific Weights of Box Furnace Slags by Reduction of Lead Sinters.** Tharcisio D. de Souza Santos and Joao Galha. *ABM (Boletim da associacao brasileira de metais),* v. 9, no. 32, July 1953, p. 424-436.
Determines by pycnometry specific weight of lead slag samples obtained by melting reduction furnace slags in electric furnace. Composition of slags studied was between 20 to 65% silica, 30 to 80% iron oxide and 5 to 40% lime. Graphs, charts. (C21, B21, Pb)

D

Ferrous Reduction and Refining

112-D. The Depression of Liquid Surfaces by Gas Jets. R. D. Collins and H. Lubanska. *British Journal of Applied Physics,* v. 5, Jan. 1954, p. 22-26.

Action of air jets on water is used to explain rapidity of reactions in side-blown converters. (D3, CN)

113-D. Oxygen Shortens Open Hearth Meltdowns. O. D. Eyre. *Steel,* v. 134, Feb. 8, 1954, p. 116, 119.

Taken from a paper presented at the Fall Meeting, Southern Ohio Section, National Open Hearth Committee, AIME. Use of auxiliary corner burners resulted in greater tonnages and better Btu. economy. Diagrams. (D2, ST)

114-D. Progress in the Development of Blast Furnace Refractories. J. Mackenzie. Paper from "Ceramics. A Symposium". The British Ceramic Society, p. 651-670 + 4 plates.

Physical and chemical changes in various types of furnaces. Diagrams, drawing, tables, photographs. 12 ref. (D1, B19)

115-D. (Czech.) **Using Oxygen for Carbon Steel Melts.** Zdenek Eminger. *Hutnické Listy,* v. 9, no. 1, Jan. 1954, p. 18-24.

Analysis of carbon oxidation by use of gaseous oxygen in electric-arc and high-frequency furnaces. Tables, graphs, photographs, diagrams. 3 ref. (D5, D6, B22, CN)

116-D. (French.) **Explosion of Cowper Chimneys.** Dardenne. *Centre de Documentation Siderurgique, Circulaire d'Informations Techniques,* 1954, no. 1, p. 127-131; disc., p. 131-132.

Circumstances and probable causes. Drawings, table. (D1)

117-D. (French.) **Dolomite Linings in a Basic Bessemer Steel Plant.** Recht. *Centre de Documentation Siderurgique, Circulaire d'Informations Techniques,* 1954, no. 1, p. 153-162.

Experiments using dolomite and tar in linings to improve operation of furnaces. (D3, ST)

118-D. (German.) **Improving Service Life of Basic Converter Linings.** Paul Metz. *Stahl und Eisen,* v. 74, no. 1, Jan. 1, 1954, p. 10-24.

Experimental results show that service life was increased by maximum residual carbon in form of graphite, maximum percentage of coarse grains in the dolomite, denseness of refractory materials, vibrating during lining process and firing with oil burners. Graphs, diagrams, photographs, tables. 23 ref. (D3, B19, CN)

119-D. (German.) **Status and Development of the Electrode Controls on Electric-Arc Steel-Melting Furnaces.** Albert Driller. *Stahl und Eisen, v.* 74, no. 2, Jan. 14, 1954, p. 82-95.

Various furnace-electrode feed controls. Diagrams, graphs, photographs. (D5)

120-D. Electric Furnace vs. Open Hearth Furnace in Cold Metal Shops. L. F. Reinartz and H. C. Barnes. *American Iron and Steel Institute, Preprint,* Dec. 3, 1953, 19 p.

Fuel, materials handling, steel quality and economic considerations. Tables. (D5, D2, A4, ST)

121-D. The Preparation of High-Purity Iron Ingots. G. W. P. Rengstorff and H. B. Goodwin. *American Iron and Steel Institute, Preprint,* Dec. 3, 1953, 7 p.

Procedure and results of chemical analysis. Tables. 6 ref. (D9, Fe)

122-D. Lone Star Steel Company Gives the South Another Source of Steel. Charles Longenecker. *Blast Furnace and Steel Plant,* v. 42, Feb. 1954, p. 198-224.

Complete new manufacturing source is described. Photographs, tables, diagrams. (D general, ST)

123-D. Measuring the Dust Content of Blast-Furnace Gas. *Engineering,* v. 177, Jan. 29, 1954, p. 146.

Continuously recording photo-electric meter. (D1)

124-D. Some Factors Affecting the Wear of Graphite Electrodes in the Electric-Arc Furnace. *Iron and Steel Institute, Journal,* v. 176, Feb. 1954, p. 159-165 + 2 plates.

Abnormally rapid wear of graphite electrode collars is usually associated with a high electrical resistivity, which is probably due to incomplete graphitization of material. Simple nondestructive resistivity tests for complete electrodes are described. Graphs, photographs, diagrams, tables. 4 ref. (D5)

125-D. Sources of Inclusions From Pouring Refractories Investigated. M. P. Fedock. *Journal of Metals,* v. 6, Feb. 1954, p. 125-127.

Ladle brick, sleeves, nozzles and fire-clay mortar are considered as sources of inclusions. Tables, diagram. 3 ref. (D9, B19)

126-D. Regenerator Efficiency and Air Preheat in the Open Hearth. B. M. Larsen. *Journal of Metals,* v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Feb. 1954, p. 129-144.

Based on three commercial furnace tests and electrical analogue calculations. Graphs, tables, diagrams. 11 ref. (D2)

127-D. Progress in Steelmaking. Integrated Electrical System; Heart of the Modern Blast Furnace. C. P. Hamilton. *Steel,* v. 134, Feb. 22, 1954, p. 113, 116, 119.

From paper presented at the Fall Meeting, AISE, Pittsburgh. Typical installation. Photographs, diagrams. (D1)

128-D. Modern Steel-Making. *Times Review of Industry (Supplement),* 1954, p. 30, 32-35.

Economy of steel production in Britain. Photographs. (D general, A4)

129-D. (Russian.) **Calculation of the Speed of Solidification of an Ingot, Taking Into Account the Temperature Dependence of the Thermophysical Parameters of the Metal.** B. I. Liubov. *Doklady Akademii Nauk SSSR,* v. 92, no. 4, Oct. 1, 1954, p. 763-766.

Method which makes it possible to take into account temperature dependence of heat conductivity and content. 4 ref. (D9)

130-D. Vermiculite in the Steel Industry. A. G. Thomson. *British Steelworker,* v. 20, Feb. 1954, p. 64-65.

Properties and applications. Use for bricks as an antipiping composition and for insulating ingots in transit. Photographs. (D9, B19)

131-D. Regenerator Efficiency and Air Preheat in the Open Hearth. II. B. M. Larsen. *Industrial Heating,* v. 21, Feb. 1954, p. 298, 300, 302, 304, 306, 397.

Factors affecting temperature of the air stream. Diagrams, graph. (To be continued.) (D2)

132-D. Temperature Distribution in the Hearths of Blast Furnaces. V. Paschkis and Taghi Mirsepassi. *Iron and Steel Engineer,* v. 31, Feb. 1954, p. 53-59; disc., p. 59-66.

Computations made to locate 2100° F. isotherm in furnaces with ceramic and carbon linings. Diagrams, graphs, photograph. (D1)

133-D. Characteristics of Slags Obtained in the Production of Ferromanganophosphorus in the Blast Furnace. A. L. Zagianskii. *Henry Brutcher, Altadena, Calif., Translation no.* 3042, 5 p. (From *Doklady Akademii Nauk SSSR,* v. 83, no. 2, 1952, p. 265-267.)

Previously abstracted from original. See item 265-D, 1952. (D1, B21, Fe-n, ST)

134-D. Continuous Casting of Gray Iron. A. N. Myasoedov and I. R. Dudnik. *Henry Brutcher, Altadena, Calif., Translation no.* 3096, 12 p. (From *Liteinoe Proizvodstvo,* v. 3, no. 11, 1952, p. 2-5.)

Report on quality of gray-iron bars obtained from a plant operated in the Soviet Union. Diagrams, photographs, micrographs, tables. (D9, CI)

135-D. Elimination of Hydrogen From Molten Steel by Flushing With Gas. R. Hamrin and F. de Kazinczy. *Henry Brutcher, Altadena, Calif., Translation no.* 3200, 24 p. (From *Jernkontorets Annaler,* v. 137, no. 7, 1953, p. 224-237.)

Nonequilibrium between hydrogen content of steel and partial pressure of hydrogen in bubbles. Theoretical treatment and comparison with experimental data. Graphs, table. 20 ref. (D general, ST)

E

Foundry

135-E. Rational Foundry Management. F. Buckley. *Foundry Trade Journal,* v. 96, Jan. 28, 1954, p. 103-106.

Factors to be considered in equipment, plant layout, procedures and personnel attitudes. Diagram, photographs. (E general)

136-E. Impregnation of Metal Castings. *Foundry Trade Journal,* v. 96, Jan. 28, 1954, p. 107-108.

Survey of available methods and materials. (E25)

137-E. Cut Tool Costs, Simplify Design With Precision Casting. Stanley Snorek. *Iron Age,* v. 173, Feb. 11, 1954, p. 136-139.

Cost of making indentical tools and fixtures for assembly operations has been substantially reduced through wider use of precision casting methods. Photographs. (E15, TS)

138-E. Diecastings. Industry Uses More for Working Parts. J. J. Obrzut. *Iron Age,* v. 173, Feb. 11, 1954, p. 140-143.

Die casting provides low-cost method of making complex parts to close tolerances at high production rates. Photographs. (E13)

139-E. (German.) **The Melting of Cast Iron Shavings in the Cupola Furnace.** S. H. Chrobok. *Giesserei,* v. 40, no. 24, Nov. 26, 1953, p. 634-637.

Economic advantages of process which makes it possible to use shavings in the same manner as other metallic charges. Diagram, photograph, tables, graph. (E10, CI)

140-E. (German.) **Economical Melting of Brass and Bronze Alloys in Reverberatory Foundry Furnaces.** E. R. Thews. *Giesserei,* v. 40, no. 25, Dec. 10, 1953, p. 658-663.

Choice of furnace, furnace linings and melting procedure. (E10, Cu)

141-E. (German.) **Quality Control in the Malleable-Iron Foundry.** V. Un-

ger. *Giesserei*, v. 40, no. 25, Dec. 10, 1953, p. 668-672.

Melting procedure, furnace lining and repair, sampling and testing. Diagrams, graphs, table. 6 ref. (E11, S12, CI)

142-E. (German.) **The CO_2 Hardening Process in the Foundry.** W. Schumacher. *Giesserei*, v. 40, no. 26, Dec. 24, 1953, p. 678-681.

New process of hardening molds and cores containing water-glass binder with flow of CO_2. Method shown to be more economical and superior to other methods. Photographs, table. (E18)

143-E. (German.) **Evaluation of Molding Machines.** W. Gesell. *Giesserei*, v. 40, no. 26, Dec. 24, 1953, p. 682-684.

Principles to be considered in comparing efficiency and maintenance costs of different molding machines. 6 ref. (E19)

144-E. (German.) **Specifications for the Production of Highly-Stressed Cast-Steel Parts.** *Giesserei*, v. 40, no. 26, Dec. 24, 1953, p. 684-685.

Importance of suitable equipment and procedure for proper casting. 6 ref. (E11, S22, CI)

145-E. (German.) **Recent Development in Construction of Pressure Casting Machine.** F. Richter. *Giesserei*, v. 41, no. 1, Jan. 7, 1954, p. 2-6.

Shows superiority of horizontal piston arrangement. Advantages and disadvantages of different ways of closing mold. Design and operation of new type machine. Diagrams, graph, photographs. (E13)

146-E. (German.) **Difference Between Hematite Pig Iron Cast in Sand and Chill Molds and Possibilities of Influencing the Structure of Chill-Mold-Cast Pig Iron.** J. Willems, W. Lückerath and H. Schroer. *Giesserei*, v. 41, no. 1, Jan. 7, 1954, p. 7-13; disc., p. 13-14.

Structure can be controlled by changing cooling rate. Photographs, graphs, micrographs. (E11, E19, CI)

147-E. (German.) **Evaluating Quality of Core Binders on Basis of Laboratory Tests.** A. Pack. *Giesserei*, v. 41, no. 2, Jan. 21, 1954, p. 33-38.

Tests on various sand core binders. Tables, graphs, photographs. 3 ref. (E18)

148-E. (German.) **Cupola-Furnace Operation. Hot Blast, Basic Cupola Furnace.** E. Piwowarsky. *Giesserei*, v. 41, no. 2, Jan. 21, 1954, p. 41-42.

Patented operation of basic-lined cupola furnaces with hot blasts up to 700° C. 4 ref. (E10)

149-E. (German.) **Combustion Processes in the Cupola Furnace.** H. Schiffers. *Giesserei*, v. 41, no. 2, Jan. 21, 1954, p. 42-44.

Reactions and equilibria of various gases with the carbon in the cupola furnace. Graphs. 16 ref. (E10)

150-E. (German.) **The Design of Modern Hot-Blast Cupola Furnaces With Consideration of New Metallurgical Information.** S. Tunder. *Giesserei*, v. 41, no. 2, Jan. 21, 1954, p. 44-45.

Features of modern cupola with respect of throat-gas exhaust, furnace charge intake, tuyeres and water cooling. Diagram. (E10)

151-E. (German.) **Hot-Blast Temperature for Cupola Furnaces.** A. Schack. *Giesserei*, v. 41, no. 2, Jan. 21, 1954, p. 45.

Importance of keeping a constant temperature of the hot blast in the regenerator. (E10)

152-E. (German.) **Pick-Up and Loss Conditions in Cupola Melting With Hot Blast.** E. Piowowarsky and H. Schiffers. *Giesserei*, v. 41, no. 2, Jan. 21, 1954, p. 47-49.

Melting with hot blast reduces loss of elements accompanying the charge because of a lower wind zone. Higher furnace temperature increases solvent power of iron and changes composition of the slag and its reactivity with the melt and furnace lining. Graph. 2 ref. (E10, CI)

153-E. **Basic Cupola Furnaces.** H. Schmidt. *Giesserei*, v. 41, no. 2, Jan. 21, 1954, p. 46-47.

Experimental results on effect of amount of coke and limestone on composition of melt and slag. Tables. 3 ref. (E10, CI)

154-E. (German.) **Computing Combustions and Determining the Functional Dependence of Variables in Cupola Melting With the Aid of Graphs.** W. Matejka. *Giesserei*, v. 41, no. 2, Jan. 21, 1954, p. 45-46.

Importance of monograms for determining operating conditions of hot-blast cupola furnaces. Graphs. 4 ref. (E10)

155-E. (German.) **Basic Melting.** O. Günthner. *Giesserei*, v. 41, no. 2, Jan. 21, 1954, p. 49.

Advantages to be considered in steel melting in basic-lined hot-blast cupola furnaces. (E10, CI)

156-E. (German.) **Three Years Plant Experience With Addition of Oxygen to the Cupola Furnace.** F. Brügger. *Giesserei*, v. 41, no. 2, Jan. 21, 1954, p. 49-50.

Equipment and procedure of melting with O_2-enriched blast and its economy. Graphs. (E10)

157-E. (German.) **Removal of Gases in Gray-Iron Casting.** A. Schmitz. *Giesserei*, v. 41, no. 2, Jan. 21, 1954, p. 51-52.

Various measures designed to allow gases to escape from green and dry-sand molds. Illustrated. Diagrams. (E19)

158-E. (German.) **Advances in Foundry Practice in the First Half Year of 1953.** Paul A. Heller. *Stahl und Eisen*, v. 74, no. 1, Jan. 1, 1954, p. 35-39; no. 2, Jan. 14, 1954, p. 106-107.

Reviews literature on solubility of carbon in molten iron; effect of silicon and manganese; mathematics of melting practice; composition and structure of molds; and various other works on foundry practice. Tables, graphs, diagrams, photomicrographs. 98 ref. (E general, Fe, Si, Mn)

159-E. **Castings for Gas Turbines.** *Aeroplane*, v. 86, Feb. 12, 1954, p. 185-186.

Production of heat resisting centrifugal castings. Photographs. (E14, SG-h)

160-E. **New Foundry Handles Alloy Steels.** A. Harrison. *Canadian Metals*, v. 17, Feb. 1954, p. 24, 26.

Operating procedures at new installation. Photographs. (E general, CI)

161-E. **Impregnating Magnesium Castings.** *Canadian Metals*, v. 17, Feb. 1954, p. 28.

Magnesium alloy gear-box castings for aircraft industry are impregnated to ensure complete soundness of material. Photographs. (E25, Mg)

162-E. **Melting of Brass and Bronze.** G. G. M. Carr-Harris. *Canadian National Research Council, Technical Information Service Report no.* 32, Nov. 1953, 25 p.

Data likely to be helpful in planning melting facilities for small foundry. Importance of satisfactory equipment and control measures. Tables, diagram. 52 ref. (E10, Cu)

163-E. **Diecasting.** *Iron Age*, v. 173, Feb. 18, 1954, p. 156-157, 160.

Vacuum method reduces internal porosity. Photographs. (E13)

164-E. **Steel Castings Production.** *Iron & Steel*, v. 27, Feb. 1954, p. 43-47.

Foundry which is notable for arrangement in same shop of separate flow-lines for mechanized, stack and jobbing molding all supplied with great variety of high-alloy steels from common melting division. Photographs, diagrams. (To be concluded.) (E10, CI)

165-E. **Shell Mold Castings.** T. W. Curry. *Materials & Methods*, v. 39, Feb. 1954, p. 102-104.

Adapted from a paper presented at the annual meeting of the Gray Iron Founder's Society, Oct. 1953. Dimensional tolerances, quality of finish, reduction of machining and cleaning operations. Photographs. (E16)

166-E. **Handling and Trimming Very Small Die Castings.** H. K. Barton. *Machinery (London)*, v. 84, Jan. 29, 1954, p. 244-252.

Increased problems encountered in trimming die castings as the plan areas of components diminish. Diagrams. (E13, E24)

167-E. **Founding Magnesium-Base Alloys. V. Various Defects.** M. Caillon. *Metal Industry*, v. 84, Jan. 29, 1954, p. 89-91.

Hot tears, cold shuts, draws and burning. Graphs, photographs. (To be continued.) (E general, Mg)

168-E. **Founding Magnesium-Base Alloys. VI. Recurring Defects. VII. Input.** M. Caillon. *Metal Industry*, v. 84, Feb. 5, p. 103-104; Feb. 12, 1954, p. 123-125.

Effect of composition on castability; effect of size of castings on ratio of metal handled to castings produced. (To be continued.) (E general, Mg)

169-E. **Faults in Pressure Die Castings. I.** W. M. Halliday. *Metallurgia*, v. 49, no. 291, Jan. 1954, p. 35-40.

General introduction. Faults due to dimensional inaccuracy. Diagrams. (E13)

170-E. **Economics of Shell Molding.** Lyle L. Clark. *Steel*, v. 134, Feb. 22, 1954, p. 120.

If casting can be made fairly easily with resultant machine-shop saving, method is advantageous. Photographs. (E16)

171-E. (French.) **The Use of Foundry Sand Tests. Proposal for a Drawing Test.** Francois Boussard. *Fonderie*, 1953, Dec., no. 95, p. 3707-3714.

Various aspects of testing molding sands using standardized method proposed by American Foundrymen's Association. Disagreement was found between laboratory tests and actual foundry practice. Graphs, diagrams. (E18)

172-E. (French.) **The Study of Feedhead. Use of Exothermic Products.** Pierre Nicolas. *Fonderie*, 1953, Dec., no. 95, p. 3715-3725.

Size of feedhead, part of the piece in which it must act and how to assure feeding. Graphs, diagrams. 8 ref. (E23)

173-E. (French.) **Inserts in Light-Alloy Castings.** *Fonderie*, 1953, Dec., no. 95, p. 3726-3727.

Precautions for avoiding cracks or bubbles which occur around inserts; insufficient anchoring of insert. (E25, Al)

174-E. (French.) **Deslagging of Cast Iron During Casting.** *Fonderie*, 1953, Dec., no. 95, p. 3728-3730.

Slagging of castings and molds of various weights. Diagrams. (E10, CI)

175-E. (French.) **Problem of Productivity in Belgian Foundries.** A. Dawans. *Revue universelle des mines*, v. 97, ser. 9, no. 10, Jan. 15, 1954, p. 3-7.

Mechanization, human relations, labor, resources, cost, quality and markets. 2 ref. (E general, A general)

176-E. (French.) **Foundry Products, High Grade Materials for Mechanical Construction.** A. Dawans. *Revue universelle des mines*, v. 97, ser. 9, no. 10, Jan. 15, 1954, p. 7-17.

Quality of foundry products, competing methods, present situation and future possibilities. Photographs, table. 7 ref. (E general)

177-E. (Japanese.) Cupola Operation With Oxygen Enriched Air. Sunao Yoshioka. *Fuel Society of Japan, Journal,* v. 32, no. 319, Nov. 1953, p. 634-641.

Experiment on effect of added oxygen in cupola blast. Graphs, tables, diagrams, photographs. (E10, CI)

178-E. (Russian.) Mechanical Properties of Metal Castings Produced by the Lost Wax Process. I. I. Goriunov and I. P. Bashkov. *Liteinoe Proizvodstvo,* 1954, no. 1, Jan.-Feb. p. 5-7.

Tensile tests on steel specimens cast in various configurations. Influence of casting procedure on heat treating properties. Tables, photographs. 4 ref. (E15, Q23, CI)

179-E. (Russian.) Application of Metal Grids in Chill Casting. I. V. Mrygin. *Liteinoe Proizvodstvo,* 1954, no. 1, Jan.-Feb., p. 7-8.

Investigates use in casting light alloys. Diagrams. (E22, Al)

180-E. (Russian.) Removal of Sulfur With Magnesium During Processing of Cast Iron. K. I. Vashchenko, P. V. Avrinskii and B. M. Pashkovskii. *Liteinoe Proizvodstvo,* 1954, no. 1, Jan.-Feb., p. 9-14.

Desulfurization action of magnesium with consideration of temperature and time factors. Tables, graphs, photographs, micrographs. 4 ref. (E25, CI)

181-E. (Russian.) Filling a Duct in a Sand Mold. B. B. Guliaev, V. M. Shpeizman and P. E. Kovalenko. *Liteinoe Proizvodstvo,* 1954, no. 1, Jan.-Feb., p. 15-17.

Study of metal flow in a mold. Graphs, diagrams, table. 3 ref. (E25)

182-E. (Russian.) Determining the Coefficient of Discharge of Pouring Systems for Steel Castings. M. A. Kremer and V. N. Dudorova. *Liteinoe Proizvodstvo,* 1954, no. 1, Jan.-Feb. p. 17-23.

Cross section of intake duct, coefficient of resistance and influence of duct contour. Diagrams, table. 4 ref. (E23, CI)

183-E. (Russian.) Casting of Automotive Camshaft. V. A. Zakharov. *Liteinoe Proizvodstvo,* 1954, no. 1, Jan.-Feb., p. 27-29.

Mechanical properties shown to be equal to conventional shafts. Micrographs, photographs, table. (E general, Q general, AY)

184-E. (Russian.) Melting of Non-Briquetted Cuttings in the Cupola Furnace. Iu. S. Sukharchuk and M. P. Nikolaichik. *Liteinoe Proizvodstvo,* 1954, no. 1, Jan.-Feb., p. 30-31.

Melts were composed of steel, cast iron and mixed cuttings. Graphs. (E10, CI, ST)

185-E. (Swedish.) Feeding and Solidification. I. Controlled Solidification. K. Akesson. *Gjuteriet,* v. 43, no. 12, Dec. 1953, p. 209-221.

Principles of directed solidification. Influence of form of casting, feeding system, rate of pouring, pouring temperature and molding materials with different thermal characteristics. Tables, diagrams, graphs. 27 ref. (E23, E25, CI)

186-E. Foundry Flexibility Permits Versatile Plant Operation. Harold J. Wheelock. *American Foundryman,* v. 25, Mar. 1954, p. 34-36.

Compounding its metals synthetically, one plant achieves predictable uniformity and accuracy of control in its castings, allowing minimized machining and close adherence to customer specifications. Photographs, diagram. (E general)

187-E. Use of Dielectric Ovens Speeds Core Production. Greg Minogue. *American Foundryman,* v. 25, Mar. 1954, p. 37-39.

With new ovens and addition of conveyor belt, production has increased 15% and better cores are produced by Moline Malleable Iron Co., St. Charles, Ill. Photographs, diagram. (E21)

188-E. Productivity Ideas Increase British Output at Small Cost. *American Foundryman,* v. 25, Mar. 1954, p. 42-46.

How visits of overseas Productivity Teams to U. S. foundries have paid off. Photographs. (E general)

189-E. Foundry Facts. *American Foundryman,* v. 25, Mar. 1954, p. 47-48.

Mold sand mixture data sheet. (E18)

190-E. Casting Quality as Related to pH Value of Molding Sands. Victor E. Zang and Gerald J. Grott. *American Foundryman,* v. 25, Mar. 1954, p. 49-59.

Better control of molding sand properties and marked reduction in casting defects accompanied adjustment of pH in green sand mixtures. Tables, graphs, photographs, diagram. 9 ref. (E18)

191-E. Shell Molds for Titanium Castings. R. M. Lang. *American Foundryman,* v. 25, Mar. 1954, p. 60-62.

Although zirconium oxychloride wash reduces degree of subsurface contamination of titanium cast in shell molds of silica, zircon and zirconia, it does not decrease over-all depth of contamination. However, the wash does improve surface finish of the casting and drastically reduces amount of pinholing. Washed zircon and zirconia molds give better surface finish to castings thicker than 1 in., but have no superiority over washed silica molds in terms of subsurface contamination. Graphs, photographs. 6 ref. (E16, Ti)

192-E. Methods for Special Pipe Production in Australia. G. J. Benson. *American Foundryman,* v. 25, Mar. 1954, p. 63-67.

Production of gray iron pipe and fittings for irrigation. Official Exchange Paper from the Australian Branch of the Institute of British Foundrymen. Diagrams. (E11, CI)

193-E. Magnesium Sand Foundry Produces Varied Castings. Robert H. Herrmann. *Foundry,* v. 82, Mar. 1954, p. 102-107.

Equipment, plant layout and operating procedures. Photographs, table. (E11, Mg)

194-E. Band Filing Helps Reduce Foundry Costs. H. J. Chamberland. *Foundry,* v. 82, Mar. 1954, p. 108-109.

Equipment and techniques. Photographs. (E24)

195-E. Foundry Research in England. William S. Pellini. *Foundry,* v. 82, Mar. 1954, p. 112-113, 296-302.

Organizational setup and types of work pursued. Photographs. (E general)

196-E. Cast-Weld Construction. John Howe Hall. *Foundry,* v. 82, Mar. 1954, p. 114-119.

Cast-weld pieces often are better and cheaper than a one-piece casting or an assembly in which no cast parts are used. Photographs. (E16, CI)

197-E. Alloy Gray Iron—What Does it Cost? *Foundry,* v. 82, Mar. 1954, p. 122-123, 311-314.

Determination of cost of special alloy irons when produced by adding alloys to base metal. Photograph. (E general, A4, CI)

198-E. Highly Mechanized Foundry. *Foundry,* v. 82, Mar. 1954, p. 138, 140.

New automatic shell molding machine which comprises basic production element. Photographs, diagram. (E16)

199-E. Trade Names of Foundry Equipment, Supplies and Services. *Foundry,* v. 82, Mar. 1954, p. 165-204.

Directory of producers of machines, materials and service distributed under various trade names and trade marks. (E general, A10)

200-E. Foundry Data Sheet. Formulas for Determining Weights of Castings. *Foundry,* v. 82, Mar. 1954, p. 207-208.

Data sheet. Diagrams, table. (E general)

201-E. Melting Iron in the Reverberatory Furnace. Carl G. de Laval. *Foundry,* v. 82, Mar. 1954, p. 224, 226, 228, 230, 232-234.

Factors affecting highest operating efficiency. (E10, CI)

202-E. ABC of Foundry Practice. Core Blowing Equipment and Use. IV. *Foundry,* v. 82, Mar. 1954, p. 237-238.

Maintenance and operation of equipment. (E21)

203-E. Core Blowing in a Steel Foundry. K. G. Marshall. *Foundry,* v. 82, Mar. 1954, p. 304-309.

Based on material originally presented by the author at the Technical and Operating Conference of Steel Founders' Society of America, 1952. Equipment and techniques. Photographs, table. (E21, CI)

204-E. Quantity Production of Engineering Castings. J. Burrell. *Foundry Trade Journal,* v. 96, Feb. 11, 1954, p. 149-155.

Cast iron foundry and methods of producing castings in widely varying batch amounts involving frequent pattern changes. Photographs, diagram. (To be continued.) (E general, CI)

205-E. Why Sand Control? C. A. Sanders. *Foundry Trade Journal,* v. 96, Feb. 11, 1954, p. 165-168.

Benefits obtained by close control of foundry sands. (E18)

206-E. Bell Founding. H. M. Howard. *Foundry Trade Journal,* v. 96, Feb. 18, 1954, p. 177-180; disc., p. 180-182.

Emphasis on qualities of casting which confer sonic excellence and tonal purity and necessary practical foundry methods undertaken to insure both. (E general, Cu, Sn)

207-E. Quantity Production of Engineering Castings. J. Burrell. *Foundry Trade Journal,* v. 96, Feb. 18, 1954, p. 183-190.

Various types of castings and methods of production. Photographs. (E general, CI)

208-E. Titanium Casting Experiments. *Light Metal Age,* v. 12, Feb. 1954, p. 24, 26, 28.

Process involves use of a vacuum and inert atmosphere arc-melting furnace and a special, but relatively inexpensive, method of making molds. Diagrams, photographs. (E10, E19, Ti)

209-E. Casting Titanium. *Metal Industry,* v. 84, Feb. 19, 1954, p. 143-144.

Development work on mold preparation and vacuum furnace. Diagram, photograph, table, radiograph. (E19, Ti)

210-E. Founding Magnesium-Base Alloys. VIII. Pouring Systems. M. Caillon. *Metal Industry,* v. 84, Feb. 19, 1954. p. 145-147.

Gates, runners and pouring basins. Photographs, diagrams. (To be continued.) (E22, E23, Mg)

211-E. Progress in Shell Moulding. *Metal Treatment and Drop Forging,* v. 21, Feb. 1954, p. 57-60.

Essential technique and subsequent development. Photographs. (E16)

212-E. Many Factors Affect Linear Shrinkage on Medium, Large Steel

Castings. Hubert Chappie. *Western Metals,* v. 12, Feb. 1954, p. 62-64.

Factors causing hindered contraction, including effect of mold design, cores, green sand vs. dry sand, pockets in cope calling for excessive gaggering and bars in the flasks, ramming and several heads on one job. Photographs. (E25, CI)

213-E. The Reaction of Solid Iron With Molten Aluminum Alloys Containing Zinc. K. Schneider and H. Kessler. *Henry Brutcher, Altadena, Calif., Translation no.* 3168, 7 p. (From *Metall,* v. 7, nos. 15-16, 1953, p. 608-610.)

Previously abstracted from the original. See item 580-E, 1953. (E25, Al, CI, CN, Zn)

214-E. (Book—German.) **(Molding Sand and Molding Materials.) Die Formsande und Formstoffe.** Karl Schiel and Robert Willy Muller. 2nd Ed. 251 p. Wilhelm Knapp Verlag, Halle, Germany. 7.80 D.M.

Data on nature and structure of sand. Uses in specific types of foundries. (E18)

F

Primary Mechanical Working

102-F. Lockheed Mechanizes Extrusion Bending. Fred C. Hoffman. *Machinery,* v. 60, Feb. 1954, p. 196-199.

Equipment and techniques employed. Photographs. (F24)

103-F. High-Speed Mill Forms, Induction Welds and Sizes Thin-Gage Nonferrous Tubing. Thomas J. Crawford. *Metal Progress,* v. 65, Feb. 1954, p. 65-69.

Machine for continuous high-speed cold forming and welding. Photographs, micrograph, diagram. (F26)

104-F. (English.) **The Sheffield Experimental Cold Rolling Mill.** H. Ford. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 19, no. 11, Nov. 1953, p. 323-329.

Investigation, equipment and instruments for measuring roll force and torque, strip tension and thickness. Diagrams, photographs. 36 ref. (F23)

105-F. (German.) **Cold Reciprocating Rolling of Pipes. Experimental Results of Investigation of the Rolling Process.** Friedrich W. Neumann and Erich Siebel. *Stahl und Eisen,* v. 74, no. 3, Jan. 28, 1954, p. 133-145.

Process, effect of various factors and calculation of rolling pressure. Graphs, photographs, diagrams, tables. 6 ref. (F23, ST, AY, Al, Cu)

106-F. (German.) **New Regulated Drive of a Rod Mill.** Karl Meister. *Stahl und Eisen,* v. 74, no. 3, Jan. 28, 1954, p. 151-154.

Shows that an a.c. shunt collector motor may be used for increasing efficiency. Photograph, diagrams, tables, graphs. (F27, ST)

107-F. Manufacture and Properties of Large Forgings. Adolph O. Schaefer. *American Iron and Steel Institute, Preprint,* Dec. 3, 1953, 27 p.

Open-die forgings made either under hammers or on presses. Photographs, tables, diagrams. (F22, Q general, ST)

108-F. Mechanized Sheet and Tinplate Mills. John H. Mort. *Iron & Steel,* v. 27, Feb. 1954, p. 55-60.

Electrical energy consumption. Tables, graphs. (To be continued.) (F23, ST)

109-F. Knurling of Cogging Rolls. A. H. Norris. *Iron and Steel Institute, Journal,* v. 176, Feb. 1954, p. 157-158.

It is believed that knurling will increase roll life and reduce fire-cracking, with small loss of output due to slipping. Photographs. (F23)

110-F. On Heavy Forging and Extrusion Presses. A. Zeitlin. *Light Metals,* v. 17, Feb. 1954, p. 62-63.

Equipment and capabilities of presses having ratings of 25,000 to 75,000 tons. Diagrams, photographs. (To be concluded.) (F22, F24)

111-F. Hot Steel Extrusions. Theodore B. Merrill, Jr. *Materials & Methods,* v. 39, Feb. 1954, p. 96-97.

Processes for shapes too complex or from alloys too brittle to roll, and small lots of special shapes. Photographs, diagram. (F24, ST)

112-F. Progress in Steelmaking. Titanium Carbide New Elixir of Life for Rod Mill Guides. S. Allen Oviatt and Patrick H. Gribbin. *Steel,* v. 134, Feb. 15, 1954, p. 128-130.

Unusual properties of new guide insert material, Kentanium, make it especially adaptable for handling red-hot rod through today's high-speed mills. Photographs, diagram. (F27, ST)

113-F. Extruding Aluminum Wheels, Fans Improves Quality, Strength and Increases Output. *Western Metals,* v. 12, Feb. 1954, p. 70-71.

Press and procedure used in hot extrusion of aluminum-alloy aircraft parts. Photographs. (F24, Al)

114-F. Steel Sheet Rolling and Annealing Practice. N. G. Fraser. *Australasian Engineer,* 1954, Jan., p. 65-74.

Various types of mills used in steel sheet rolling. Reasons for annealing sheets and manner in which operation is carried out. Graphs, drawings, photographs. 4 ref. (F23, J23)

115-F. Extrusion of Alloy Steels. New 1,150-Ton Loewy Press at Low Moor Fine Steels, Ltd. *British Steelworker,* v. 20, Feb. 1954, p. 60-62.

Hydraulic press, dies and process using glass as a lubricant. Diagram. (F24, AY, SS)

116-F. Forging Brass. V. *Copper & Brass Bulletin,* 1954, Feb., no. 167, p. 8-9.

Standard alloy for hot forged or die pressed parts is forging brass which possesses ideal combination of properties. Table, photographs. (F22, Cu)

117-F. Impact of Technical Developments in Light Flat Rolling on the Consuming Industries. William T. Hogan. *Iron and Steel Engineer,* v. 31, Feb. 1954, p. 67-71; disc., p. 71-72.

Recent developments in rolled products. Includes electrolytic tin plating, continuous galvanizing and annealing and magnetic properties of iron-silicon alloys. Tables. (F23, L17, L16, J23, P16, AY, Sn, Zn)

118-F. Heat Processing in Industry—Facts and Figures. Frederic O. Hess. *Iron and Steel Engineer,* v. 31, Feb. 1954, p. 73-84; disc., p. 84.

Furnace design, heat transfer, temperature control and effects of various heating cycles on microstructure of steel blooms. Diagrams, graphs, micrographs, photographs. (F21, M27, ST)

119-F. Electrical Systems for Hot Strip Mills. R. E. Marrs. *Iron and Steel Engineer,* v. 31, Feb. 1954, p. 99-106; disc., p. 106-108.

Width and thickness gages, speed and voltage regulators, individual generators, magnetic amplifiers and synchronous motors. Circuit diagrams, table, photographs, graphs. (F23, S14)

120-F. Drop Forgings From the Customer's Viewpoint. R. J. Brown. *Metal Treatment and Drop Forging,* v. 21, Feb. 1954, p. 51-55; disc., p. 55-56.

Much can be done to increase probability of poor quality steel being detected before forging operations. Closer control can be given to sensitive heat treatment operations essential to attain the best properties from lean alloy steels. Photographs. (F22, AY)

121-F. Oils for Metal Rolling. A. L. H. Perry. *Scientific Lubrication,* v. 6, Feb. 1954, p. 14-20.

Equipment and classes of oils. Photographs, diagram. 2 ref. (F1)

122-F. A Comparison of American and German Drop Forging Development. Paul Hansen. *Steel Processing,* v. 40, Feb. 1954, p. 77-83.

Reason for difference in productivity may be the fact that in American forging plants, manufacturing process can be designed for an exceptionally high volume of identical parts. Photographs, tables, diagram. (F22)

123-F. Internal Stresses in Some Types of Forging. I. Charles Sykes. *Steel Processing,* v. 40, Feb. 1954, p. 101-107, 118, 120.

Diagrams, graphs, tables. 9 ref. (To be continued.) (F22, Q25)

124-F. A Layman's Comparison of Methods for Rapid Heating of Larger Steel Sections. H. E. Trout, Jr. *Steel Processing,* v. 40, Feb. 1954, p. 111-114.

Rapid heating with gas and heating by induction. Photographs, graph. (F21)

125-F. Press Forging. Ralph H. Eshelman. *Tool Engineer,* v. 32, Mar. 1954, p. 77-86.

Review of mechanical and hydraulic dies, presses and procedures. Discussion of automation. Graphs, photographs, tables, diagrams, nomogram. (F22, Cu)

126-F. Integrated Shop Produces Close Tolerance Upset Forgings With Weight, Cost Savings. V. J. Taylor and L. R. Huizenga. *Western Metals,* v. 12, Feb. 1954, p. 47-49.

Superior qualities of forgings, forging presses and dies and examples of artillery shells and other items produced by forging. Photographs. (F22, CN)

127-F. Fundamental Aspects of the Cold Working of Metals. Maurice Cook and T. L. Richards. Paper from "The Cold Working of Non-Ferrous Metals and Alloys". Institute of Metals, Monograph and Report Series no. 12, p. 7-26; disc., p. 165-206 + 2 plates.

Provides background study, in light of existing knowledge and concepts, of mechanism of changes which take place when metals and alloys are plastically deformed in the cold state. Micrographs. 37 ref. (F general, G general)

128-F. Lubricants for the Cold Working of Non-Ferrous Metals. S. F. Chisholm. Paper from "The Cold Working of Non-Ferrous Metals and Alloys". Institute of Metals, Monograph and Report Series no. 12, p. 27-44; disc., p. 165-206.

Processes of cold rolling and press, tube and wire drawing in light of demands they make on lubricants. Suitable lubricants suggested in each case based on practical experience. Table. (F1, Cu, Al)

129-F. The Cold Rolling of Non-Ferrous Metals in Sheet and Strip Form. C. E. Davies. Paper from "The Cold Working of Non-Ferrous Metals and Alloys". Institute of Metals, Monograph and Report Series no. 12, p. 45-80; disc., p. 165-206 + 4 plates.

Modern technique in production of cold rolled sheet and strip in the two classes of material which form

the bulk of the output of the nonferrous metal mills. Copper and copper alloys and aluminum and its light alloys. Diagrams, photographs. 3 ref. (F23, Cu, Al)

130-F. Wire-Drawing Technique and Equipment. F. T. Cleaver and H. J. Miller. Paper from "The Cold Working of Non-Ferrous Metals and Alloys". Institute of Metals, Monograph and Report Series no. 12, p. 81-106; disc., p. 165-206 + 4 plates.

Principal landmarks in development of wire drawing industry in England from earliest beginnings until present times. Description of present day machines; detailed account of current practice in production of copper, brass, bronzes and other copper alloy wire, and of aluminum and alloy wires. Various types of defects which are encountered. Diagrams, tables, flowsheets, photographs. (F28, Cu, Al)

131-F. (Russian.) **Modern Methods of Processing Metals.** A. E. Prokopovich. *Fizika v Shkole,* v. 14, no. 1, Jan.-Feb. 1954, p. 8-26.

Various metalworking processes. Diagrams, photographs. (F general, G general)

G

Secondary Mechanical Working

122-G. Forming Magnesium-Alloy. *Aircraft Production,* v. 16, Feb. 1954, p. 52.

Method for continuously heating work and dies during processing. Diagram. (G general, Mg)

123-G. Electro-Erosion Machining. *Aircraft Production,* v. 16, Feb. 1954, p. 70-71.

Design and operating characteristics of new machine for automatic operation. Photographs, micrographs. (G17)

124-G. Cool Tip, Not Chip, With CO_2. *American Machinist,* v. 98, Feb. 15, 1954, p. 130-133.

New English technique applies coolant through lathe-tool shank, with reservoir under carbide tip and orifices aimed at work, not chips. The result is doubled or tripled cutting speeds. Photographs, diagram. (G21)

125-G. Low-Melting Alloys Provide Low-Cost Method to Spin Re-Entrant Shapes. Denver Sams and Joseph Borodavchuk. *American Machinist,* v. 98, Feb. 15, 1954, p. 145-147.

When limited quantity limits chuck cost, cast alloy can be machined to shape parts that will not slip off the chuck. The spun shell can be removed when completed by melting the chuck. Diagrams, photographs. (G13)

126-G. Cope Talks on Draw Dies. IX. Know the Wrinkles About Spherical Shells. Stanley R. Cope. *American Machinist,* v. 98, Feb. 15, 1954, p. 148-152.

Knowledge of rules and suitable die design should eliminate drawing troubles. Diagrams. (G4)

127-G. Why Line Your Sludge Tank With Diamonds? N. W. Thibault and B. H. Anderson. *American Machinist,* v. 98, Feb. 15, 1954, p. 154-156.

Electrolytically-assisted diamond-wheel grinding continues to show promise as a commercial method for sharpening single-point carbide tools without sacrificing tool performance. Photographs, tables. (G18, TS)

128-G. An Evaluation of Spinning vs. Drawing. John W. Lengbridge. *American Society of Tool Engineers, Technical Papers and Panel Discussion,* v. 21, 1953, 17 p.

Time and cost criteria and dimensional accuracy requirement are among considerations. Tables, graph, photographs, drawings. (G13, G4)

129-G. Developments in Electrolytic Grinding. L. H. Metzger. *American Society of Tool Engineers, Technical Papers and Panel Discussion,* v. 21, 1953, 10 p.

Brief essentials of the process with over-all picture of its merits and applications. Drawing, photographs. (G18)

130-G. Some Basic Relations in Contour Forming. George Sachs. *American Society of Tool Engineers, Technical Papers and Panel Discussion,* v. 21, 1953, 6 p.

Limitations of bending-type contour forming. Drawings, graphs. (G1, Al)

131-G. Structure as an Index to Machinability. Norman Zlatin and John F. Kahles. *American Society of Tool Engineers, Technical Papers and Panel Discussion,* v. 21, 1953, 10 p.

Considerable savings in machining costs are available to those who give some thought to the microstructure of the metals they are machining. Table, micrographs, graphs. (G17, ST, CI, Ni)

132-G. Tool Engineering Applications of Titanium Carbide Alloys. W. L. Kennicott. *American Society of Tool Engineers, Technical Papers and Panel Discussion,* v. 21, 1953, 7 p.

These compositions were developed primarily for their heat resistant properties of high strength, thermal shock and oxidation resistance at temperatures of 1600° F. and above. Photographs, drawings, graph, table. (G17, Q general, Ti, C-n)

133-G. Wax Lubricants in Metal Working. James B. Carse, A. E. Budner and George L. Boehm. *American Society of Tool Engineers, Technical Papers and Panel Discussion,* v. 21, 1953, 19 p.

Properties defined. Classifications and typical examples. Tables. (G21)

134-G. How Does Titanium Machine? III. O. W. Boston. *Iron Age,* v. 173, Feb. 4, 1954, p. 146-149.

Data on drilling and reaming. Graphs, table, photograph. (G17, Ti)

135-G. Get More From Your Surface Plates. John Hyler. *Iron Age,* v. 173, Feb. 4, 1954, p. 156-158.

Ideas on how to get the most from investment in metal and granite surface plates. Photographs. (G17)

136-G. A Tool-Blade Wear Test for Cutting Fluids. L. C. Hays and E. J. R. Hudec. *Lubrication Engineering,* v. 10, Feb. 1954, p. 20-23.

Method of evaluating cutting fluids on a lathe involving measuring wear of blunt tool blade which is rubbed against freshly cut surface under applied load. Tables, diagram, graphs. 3 ref. (G21)

137-G. Lubricants Aid Abrasive-Belt Grinding and Polishing. Jack Durnan. *Machinery,* v. 60, Feb. 1954, p. 173-176.

Factors affecting selection of lubricant and advantages of each. Photographs. (G21, G18)

138-G. The Influence of Machining and Grinding Methods on the Mechanical and Physical Condition of Metal Surfaces. Peter Spear, Ian R. Robinson and K. J. B. Wolfe. Paper from "Properties of Metallic Surfaces, Symposium". Institute of Metals, Monograph and Report Series 13. p. 59-100.

Problems associated with physics and chemistry of metal surfaces. Spectrographs, tables, micrographs, graphs, photographs. 12 ref. (G17, G18, P general, Q general)

139-G. (French—German.) **Physical and Technological Principles of Oxygen Cutting.** C. G. Keel. *Zeitschrift für Schweisstechnik,* v. 44, no. 1, Jan. 1954, p. 1-5.

Cutting of various metals and properties of oxides formed. Diagrams, graphs, table. (To be continued.) (G22)

140-G. (German.) **Powder-Dressing Process.** E. Zorn. *Metalloberfläche,* Ausgabe A, v. 8, no. 1, Jan. 1954, p. 8-9.

Iron powder flame process of dressing unalloyed or low-alloyed steel castings. Photographs, micrograph. (G22, CI)

141-G. (German.) **Designing to Meet Requirements of Flame Cutting.** Hans von Hofe. *Schweissen und Schneiden,* v. 5, no. 12, Dec. 1953, p. 463-472.

Methods, equipment, quality and accuracy of cut, guides and warp condition. Tables, graphs, photographs, diagrams. 5 ref. (G22)

142-G. (German.) **Stripper Pressure in Deep Drawing.** Erich Siebel. *Stahl und Eisen,* v. 74, no. 3, Jan. 28, 1954, p. 155-158.

Formation of wrinkles, deformation and buckling process. Diagrams, graphs, tables. (G4, Q28)

143-G. Discontinuous Chip Formation. N. H. Cook, Iain Finnie and M. C. Shaw. *ASME, Transactions,* v. 76, Feb. 1954, p. 153-162.

Influence of several variables with regard to chip discontinuity. Examples to illustrate principal points. Diagrams, graphs, photomicrographs, table. 8 ref. (G17)

144-G. The Friction Terms in Metal Cutting. W. C. Leone and Edward Saibel. *ASME, Transactions,* v. 76, Feb. 1954, p. 195-197; disc., p. 197-198.

Results of an investigation of metal cutting. Diagrams, graphs, tables. 6 ref. (G17)

145-G. Predicting the Angle of Chip Flow for Single-Point Cutting Tools. L. V. Colwell. *ASME, Transactions,* v. 76, Feb. 1954, p. 199-203; disc., p. 203-204.

Method for predicting direction of tool shapes and cutting conditions. Graphs, diagrams. (G17)

146-G. On the Analysis of Cutting-Tool Temperatures. E. G. Loewen and M. C. Shaw. *ASME, Transactions,* v. 76, Feb. 1954, p. 217-225; disc., p. 225-231.

Analytical procedure to be followed in computing cutting temperatures presented and illustrated by several examples. Graphs, diagrams, table. 18 ref. (G17, SS, AY, Ti)

147-G. Friction Sawing Cuts Off High Costs. H. J. Chamberland. *Iron Age,* v. 173, Feb. 18, 1954, p. 152-154.

Equipment and economical operating characteristics. Photographs, tables. (G17)

148-G. Machining. *Iron Age,* v. 173, Feb. 18, 1954, p. 169-170.

New boring machine holds close concentricity. Photograph. (G17)

149-G. Magnesium Impacts. T. L. Patton. *Machine Design,* v. 26, Feb. 1954, p. 124-128.

Impact extrusion as a practical production method, broadening the possibilities of designing for lower cost. Photographs, tables, graph, diagrams. (G5, Mg)

150-G. Fundamentals of Production Tapping. R. H. Cowan. *Machinery (London),* v. 84, Jan. 29, 1954, p. 234-236.

Lubricants, design of work pieces and tapping fixtures. Diagram, photograph. (G17)

151-G. Grinding Hazards. W. R. Hardwick. *Metallurgia,* v. 49, no. 291, Jan. 1954, p. 21-25.

Grinding of tools is accompanied by local heat generation. Unless the operation is carried out correctly it can result in softening and cracking of surface of the tool. Effects may be aggravated by incorrect heat treatment prior to grinding. Photographs, micrographs, table, graph. (G18)

152-G. Manufacturing Aluminum Extruded Combination Doors. Walter Rudolph. *Modern Industrial Press,* v. 16, Feb. 1954, p. 13-14, 18, 22.

Fabrication procedures including drilling, punching and riveting. Photographs. (G17, G2, G5, K13, Al)

153-G. Seven Ways of Forming Magnesium Sheet. *Product Engineering,* v. 25, Feb. 1954, p. 135-141.

Data show that magnesium can be fabricated with less trouble than other sheet metals. Graphs, diagrams, tables. (G general, Mg)

154-G. The Forming of Aluminium Sheet. IV. Deep Drawing and Pressing. H. Hinxman. *Sheet Metal Industries,* v. 31, no. 322, Feb. 1954, p. 93-98.

Forming methods adopted with aluminum and its alloys, showing how these materials compare favorably with others in their response to drawing and pressing. Photographs, diagrams, drawing. 3 ref. (G4, G1, Al)

155-G. Stampings Offer Way to Cut Corners. *Steel,* v. 134, Feb. 15, 1954, p. 112-113.

Reports that 14-part assembly which required welding, machining and assembling can be incorporated into a single stamping. Photographs. (G3)

156-G. Aluminium Alloy and Stainless Steel Fabrication. *Welding and Metal Fabrication,* v. 22, Feb. 1954, p. 46-51.

Equipment and processing operations. Photographs.
(G general, K general, Al, SS)

157-G. The Development of Oxygen Cutting Machines. L. J. Hancock. *Welding and Metal Fabrication,* v. 22, Feb. 1954, p. 59-60, 61-63.

Trends in equipment. Techniques from first machines through modern ones. Photographs. (G22)

158-G. In the Fabrication Shop. *Welding and Metal Fabrication,* v. 22, Feb. 1954, p. 78-79.

Practical aspects of welding and metalworking. Photographs, diagrams. (G general, K general)

159-G. Heavy-Duty Carbides. *Western Machinery and Steel World,* v. 45, Feb. 1954, p. 94-95.

Heavy-duty steel cutting carbides have been developed that are suitable for severe cutting conditions. Photographs, micrographs.
(G17, C-n)

160-G. (French.) **Stabilization of Light-Alloy Castings.** *Fonderie,* 1953, Dec., no. 95; p. 3731-3732.

Causes and remedies of expansion and deformations of castings which occur during machining. Table.
(G17, EG-a)

161-G. (French.) **Technical Notes From the 5th International Congress of Mechanical Works in Turin.** *Métallurgie et la construction mécanique,* v. 85, no. 12, Dec. 1953, 30 p.

Includes machining by cutting tools and electricity; finishing; progress in foundry techniques; precision foundry work; stamping, forging, extrusion, flanging and cutting; powder metallurgy; welding procedures; and other joining methods. Graph, diagrams, photographs.
(G general, E general, F general, H general, K general)

162-G. (Russian.) **Influence of Lubricants on the Coefficient of Friction During the Deep Drawing of Metals.** S. Ia. Veiler and G. I. Epifanov. *Doklady Akademii Nauk SSSR,* v. 92, no. 3, Sept. 21, 1953, p. 593-595.

Investigations on steel, brass and copper test specimens using nonlyic acid and butyl and methyl alcohol lubricants. Graph. 6 ref.
(G21, ST, Cu, Zn)

163-G. A New Look at Cutting Fluids. Harry N. Leave. *American Machinist,* v. 98, Mar. 1, 1954, p. 97-99.

Factors to be considered in selection of fluid for particular application. (G21)

164-G. Magnesium Grinding Precautions. *Light Metal Age,* v. 12, Feb. 1954, p. 18-19, 32.

Fire hazard, dust, coolants and precautions. Photograph, diagrams. (G18, A8, Mg)

165-G. Light Alloy Torpedo Tubes. W. H. Dann. *Light Metals,* v. 17, Feb. 1954, p. 48-51.

Fabrication procedures including forming and arc welding. Photographs. (G general, K1, EG-a)

166-G. Lubrication in the Cutting of Metals. Antoni Niedzwiedzki. *Machinery (London),* v. 84, Feb. 12, 1954, p. 337-343.

Classification of cutting fluids; properties of cutting oils and aqueous emulsions and use of compressed gases as cooling media in metal-cutting operations. Graphs, diagrams, tables, photographs. (To be continued.) (G21)

167-G. Metal Working Lubricants. *Metal Industry,* v. 84, Feb. 1954, p. 151-152.

Problems affecting lubricants for cold drawing nonferrous metals and alloys. (To be continued.)
(G21, EG-a)

168-G. Lubricants for Metalworking. *Metal Treatment and Drop Forging,* v. 21, Feb. 1954, p. 61-65.

Applications in nonferrous metal industries. (G21)

169-G. The Essential Elements of Die Forming. *Metal-Working,* v. 10, Mar. 1954, p. 16-19.

Typical forming dies for many varied uses. Diagrams, table. (G1)

170-G. Deep Draws Don't Follow Rules. J. Walter Gulliksen. *Steel,* v. 134, Mar. 1, 1954, p. 140-141.

Basic principles and variables to be considered. Diagrams, photographs. (G4)

171-G. Preventing Press Failures. Press Alignment and Speeds. A. F. Gagne, Jr. *Tool Engineer,* v. 32, Mar. 1954, p. 54-56.

Punching, blanking and drawing practice. Graph, photographs, tables (G1)

172-G. Basic Tooling for Spinning Metals. Francis L. Coenen. *Tool Engineer,* v. 32, Mar. 1954, p. 57-63.

Spinability of metals, spinning blocks, rollers, hand tools, lubricants and accessories. Photographs, diagrams, tables. (G13, SS, Mg)

173-G. Titanium, How to Deep Draw it. Carter C. Higgins. *Tool Engineer,* v. 32, Mar. 1954, p. 75-76.

Drawability of alloys, galling, seizing tendencies, die lubricants and chemical treatment of drawing blanks. Photographs. (G4, Ti)

174-G. Which Flame Was Faster? F. W. Sowa and W. C. Truckenmiller. *Welding Engineer,* v. 39, Mar. 1954, p. 43, 48.

Relative performance of acetylene and propane were tested as preheating gases for oxygen cutting of carbon steels. Photographs, table. (G22, CN)

175-G. Investigation of Lubricating Action in Deep Drawing Using a Model. S. Y. Veiler, L. A. Shreiner and P. A. Rebinder. *Henry Brutcher, Altadena, Calif., Translation no.* 3195, 6 p. (From *Doklady Akademii Nauk SSSR,* v. 73, no. 3, 1950, p. 511-513.)

Previously abstracted from original. See item 336-G, 1950. (G4, G21)

176-G. The Deep Drawing and Pressing of Non-Ferrous Metals and Alloys. J. Dudley Jevons. Paper from "The Cold Working of Non-Ferrous Metals and Alloys". Institute of Metals, Monograph and Report Series no. 12. p. 107-163; disc., p. 165-206 + 4 plates.

A number of ordinary and special tests applicable to sheet and their limited usefulness in predicting behavior under the press. A method for routine acceptance testing of sheet under industrial conditions. Phenomena of stretcher-strain markings and of season cracking. Photographs, micrographs, diagrams. 46 ref. (G4, G1, ST)

177-G. (Book.) **The Cold Working of Non-Ferrous Metals and Alloys.** Institute of Metals, Monograph and Report Series no. 12. 207 p. 1952. Institute of Metals, 4 Grosvenor Gardens, London, S.W. 1, England. $2.50.

From a symposium held at London, at the Annual General Meeting of the Institute, Mar. 14, 1951. Papers are separately abstracted.
(G general)

178-G. (Book.) **Collected Papers 1953. Technical Papers and Panel Discussions (Annual Vol.),** v. 21, 1953. Sections individually paged. American Society of Tool Engineers, Detroit, Mich. $4.00

Discussions on machinability, metal working, adhesives and tool applications. Papers are separately abstracted. (G general, K12, T6)

H
Powder Metallurgy

38-H. Economic Survey of Seven Methods of Making Small Machine Parts. Samuel Storchheim. *Metal Progress,* v. 65, Feb. 1954, p. 77-80.

Six manufacturing methods compared with powder metallurgy method in manner analogous to that which a machine parts designer might use for comparison. Table, photograph.
(H general, G general, E12, E13, E15)

39-H. Powder-Metallurgy Technique. *Overseas Engineer,* v. 27, Feb. 1954, p. 254-255.

Reports that heavy machining costs can be eliminated or reduced on components of complex section. Photographs, drawings, table.
(H general)

40-H. Metal-Ceramic Interactions. IV. Absolute Measurement of Metal-Ceramic Interfacial Energy and the Interfacial Adsorption of Silicon From Iron-Silicon Alloys. W. D. Kingery. *American Ceramic Society, Journal,* v. 37, Feb. 1954, p. 42-45.

Surface and interfacial energies in the system Ni-Al_2O_3 and Ni-ZrO_2 determined at elevated temperatures by means of equilibrium interfacial angle measurements. Diagrams, graphs, tables. 12 ref.
(H11, P10, Ni)

41-H. Sintered Refractory Alloys. A. Carter. *Metallurgia,* v. 49, no. 291, Jan. 1954, p. 8-14.

Use of metal refractory alloys in gas turbines operating at high temperatures. Tables, micrographs. 27 ref. (H general, T25)

42-H. Powder Metallurgy Gaining in West Coast Use. Irving J. Dona-

hue. *Western Machinery and Steel World,* v. 45, Feb. 1954, p. 99-102.

Developments in powder metallurgy have come at an increased rate. Tables, drawings. (H general)

43-H. (German.) **The Electrolytic Deposition of Metal Powders. The Theory of Discharge of Complex Ions.** N. Ibl and G. Trümpler. *Helvetica Chimica Acta,* v. 36, no. 7, 1953, p. 2023-2027.

Deposition and neutralization of complex ions at the cathode explained as cause of loose or spongy metal deposits from salt solutions. 46 ref. (H10)

44-H. (German.) **Sintering Copper.** O. Kayser, O. Knacke and I. N. Stranski. *Zeitschrift für Elektrochemie,* v. 57, no. 10, 1953, p. 924-927.

Experiments to investigate adherence of copper sphere to copper rod at 520 to 730° C. as a function of time. Diagrams, graphs, table. 18 ref. (H15, Cu)

45-H. Preliminary Results on the Infiltration of Titanium Carbide With Cobalt. Herman Blumenthal. *Powder Metallurgy Bulletin,* v. 6, Dec. 1953, p. 186-188.

Infiltration method and materials used. Results of tests. Table. 6 ref. (H16, Ti, C-n, Co)

46-H. Investigation of the Mechanism of the Formation of Titanium Carbide in Vacuo. G. A. Meerson and O. E. Krein. *Henry Brutcher, Altadena, Calif., Translation no.* 3121, 17 p. (From *Zhurnal Prikladnoi Khimii,* v. 25, no. 2, 1952, p. 134-147.)

Influence of reduced pressures and of temperature on degree of carburization of titanium. Choice of optimum conditions for producing titanium carbide of theoretical composition. Tables, graphs. 7 ref. (H general, C-n)

47-H. New Process for the Reduction of Iron Powders. H. Siepmann. *Henry Brutcher, Altadena, Calif., Translation no.* 3192, 12 p. (From *Stahl und Eisen,* v. 73, no. 6, 1953, p. 360-364.)

Previously abstracted from original. See item 43-H, 1953. (H10, Fe)

48-H. (English.) **Studies on the Sintering of the Metallic Powder of the Iron Family. I. Magnetic Properties of the Sintered Iron Compact. II. The Effect of the Atmosphere on the Sintered Metallic Compact.** Akinori Takasaki. *Science Reports of the Research Institutes, Tohoku University,* Series A, v. 5, no. 4, Aug. 1953, p. 358-376.

Effects of porosity, carbon content and sintering variables on magnetic properties. Diagrams, tables, graphs, micrographs. (H15, P16, Fe)

49-H. (English.) **Studies on the Sintering of the Metallic Powder of the Iron Family. III. On the Sintering of Cast Iron Powder. IV. Studies on the Sintered M.K. Type Magnet.** Akinori Takasaki. *Science Reports of the Research, Institutes, Tohoku University,* Series A, v. 5, no. 5, Oct. 1953, p. 469-492.

Studies on cast iron pulverized in a stamp mill and Alnico-type combinations of iron, aluminum and cobalt powders. Effects of particle size and sintering time and atmosphere. Diagrams, graphs, tables. 4 ref. (H15, P16, Al, Fe, Ni, Co, CI)

50-H. (German and French.) **Properties and Applications of Sintered Aluminum.** R. Irmann. *Aluminium Suisse,* v. 4, no. 1, Jan. 1954, p. 24-32.

Preparation and mechanical and physical properties of powder. Photographs, graphs, micrographs, tables. 25 ref. (H10, H11, Al)

51-H. (German.) **The Process of Thermal Reaction.** S. Krapf. *Berichte der deutschen keramischen Gesellschaft,* v. 31, no. 1, Jan. 1954, p. 18-21.

Process of producing ceramic or metal-ceramic bodies based on principle of first igniting a reactive mixture which will then react exothermally to form desired compounds. Diagrams, graph, photographs. (H12, Al, Cr, Fe)

52-H. (Portuguese.) **Study of Properties of Sintered Brasses and Bronzes.** Vicente Chiaverini and Carlos de Revoredo Barros. *ABM (Boletim da associacao brasileira de metais),* v. 9, no. 32, July 1953, p. 313-331.

Physical characteristics of brasses and bronzes obtained by powder metallurgy under various conditions of molding pressure and sintering temperature. Proves possibility of producing these alloys by sintering with reasonable density and mechanical-property values. Photographs, micrographs, tables, graphs. 8 ref. (H14, H15, Cu, Zn, Sn)

J

Heat Treatment

91-J. Heat Treatment of Titanium Generalized in Terms of Beta Prime. Leonard D. Jaffe. *Journal of Metals,* v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Feb. 1954, p. 210.

Guide for practical heat treatment. Graph. 9 ref. (J general, Ti)

92-J. Annealing of a Cold Rolled Aluminum Single Crystal. A. H. Lutts and P. A. Beck. *Journal of Metals,* v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Feb. 1954, p. 257-260.

Experimental procedures and results. Graphs, photographs. 14 ref. (J23, Al)

93-J. Effective Heat Treatment of Molybdenum. T. G. Perry, H. S. Spacil and John Wulff. *Metal Progress,* v. 65, Feb. 1954, p. 75-77.

Temperature and time of annealing to avoid brittleness. Relation to distribution of residual oxygen. Micrographs. (J23, Q23, Mo)

94-J. Dew Point—A Means of Measuring the Carbon Potential of Prepared Atmospheres. Norbert K. Koebel. *Metal Progress,* v. 65, Feb. 1954, p. 90-96, 96B, 172.

Equilibrium relationships between the dew point of endothermic furnace atmosphere and various carbon, alloy and toolsteels. Diagram, table, micrograph, graphs, photograph. (J2, ST)

95-J. (German.) **Spectrographic Determination of Surface Carburization and Decarburization.** Werner Liedtke. *Archiv für das Eisenhüttenwesen,* v. 24, nos. 11-12, Nov.-Dec. 1953, p. 465-467.

Improved method. Compares results with chemical and microscopic determination. Photograph, micrographs, graph, spectrogram, table. (J28, S11, Fe)

96-J. (German.) **Hardenability of Different Commonly Used Structural Steels According to Jominy End-Quench Test.** Heinz Kiessler and Karl Schweyher. *Archiv für das Eisenhüttenwesen,* v. 24, nos. 11-12, Nov.-Dec. 1953, p. 475-481.

Divergence in hardness curve due to sampling was shown to be very small indicating reliability of Jominy test. Table, graphs. 10 ref. (J26, AY)

97-J. (German.) **Inductive Surface Hardening of Cast Steel.** G. W. Seulen. *Giesserei,* v. 41, no. 2, Jan. 21, 1954, p. 40-41.

Surfaces of steel heated by induction and quenched can be hardened to depths of 1 to 8 mm. and hardness of Rockwell 55 to 60. 2 ref. (J2, J28, Q29, CI)

98-J. Heat-Treatment of Spheroidal-Graphite Cast Iron. Marcel Ballay, Raymond Chavey and Jacques Grilliat. *Foundry Trade Journal,* v. 96, Feb. 4, 1954, p. 125-128.

Hardening by means of quenching after localized heating and annealing for the relief of internal stresses. Tables, graphs, photograph. 2 ref. (J26, J1, CI)

99-J. The Heat-Treatment of High-Carbon, High-Chromium Tool Steel. J. Lomas. *Machinery Lloyd (Overseas Ed.),* v. 26, Jan. 30, 1954, p. 75, 77-78.

Typical procedure. (J general, TS)

100-J. Carbon Controller for Carburizing and Carbon Restoration. Wayne L. Besselman. *Materials & Methods,* v. 39, Feb. 1954, p. 110-112.

Device for more accurate heat treatment. Photographs, graph. (J28, ST)

101-J. New Surface Hardening Unit Provides Accurate Temperature Control. Joseph H. Bockrath. *Metal Treating,* v. 5, Jan.-Feb. 1954, p. 2-3, 18.

Gas unit that selectively hardens all types of gears, segments and cylinders up to 36 in. diameter. Photographs, micrographs. (J28, ST)

102-J. Facts and Figures on Heat Treating Costs. Horace C. Knerr. *Metal Treating,* v. 5, Jan.-Feb. 1954, p. 4-5, 35.

Small users' operational costs. Table. (J general, A4)

103-J. Propane-Air Gas Standby Plant Protects Output of New Wire Mill. Paul E. Peacock, Jr. *Metal Treating,* v. 5, Jan.-Feb. 1954, p. 6-7, 17.

A gas-fired heat treating plant. Photographs. (J general)

104-J. Furnace Symposium. VII. Continuous Reciprocating Furnaces. F. C. Schaefer. **VIII. Continuous Roller Hearth Furnace.** A. R. Robertson. *Metal Treating,* v. 5, Jan.-Feb. 1954, p. 8-12, 14.

Construction, operation and advantages. Photographs. (J general)

105-J. Salt Baths. Versatile Performers on the Heat Treating Team. L. B. Rosseau. *Steel,* v. 134, Feb. 15, 1954, p. 108-111.

For heating and cooling metals, the salt bath furnace has a wide field of usefulness. Basic characteristics that back up present-day applications. Photographs, tables, graphs. (J2)

106-J. Induction Preheating and Stress-Relieving for High-Pressure Steam and Water Pipelines. A. Luthy. *Welding and Metal Fabrication,* v. 22, Feb. 1954, p. 64-68.

Equipment and techniques in practice. Photographs, diagram. (J2, J1, CN)

107-J. Precision Furnace Unit Employed for Magnesium Castings to Avoid Distortion, Improve Strength. B. Walker. *Western Metals,* v. 12, Feb. 1954, p. 50-52.

Gas-fired, controlled atmosphere furnace holds temperature uniformity of ±3° F. Photographs, chart. (J2, Mg)

108-J. (Dutch.) **Heat Treating High Speed Steels.** J. C. C. Stegwee. *Metalen,* v. 8, no. 21, Nov. 15, 1953, p. 382-388.

Effect of heat treating time and temperature on microstructures and properties of high speed toolsteels. Photomicrographs, tables, graphs. (J26, TS)

109-J. (Russian.) **Control of Annealing of Malleable Iron by Its Magnetic Properties.** K. P. Zhadnov. *Liteinoe*

Proizvodstvo, 1954, no. 1, Jan.-Feb., p. 29-30.

Compares results with Brinell hardness measurements. Graphs, micrographs, table. (J23, P16, Q29, CI)

110-J. Heat Treating of Aluminum. Edward S. Bunn. *Industrial Heating,* v. 21, Feb. 1954, p. 236-238, 240, 242, 244, 246, 248, 406, 408, 410.

Gas heating operations involved in processing aluminum. Photographs, graphs, photomicrographs, tables. 3 ref. (J general, Al)

111-J. Stress Relieving Furnace at Minimum Investment. Fred M. Burt. *Industrial Heating,* v. 21, Feb. 1954, p. 264, 266, 268.

Furnace for stress-relieving welded structures. Photographs. (J1)

112-J. Industrial Furnaces. *Iron Age,* v. 173, Feb. 25, 1954, p. 111-190.

Survey of latest developments including surface treating and hardening, controlled heating and cooling, sintering, brazing, lower temperatures, enameling, galvanizing and heating for hot forming. Photographs, diagrams, graph, tables. (J28, K8, F21, L27, L16, B16)

113-J. Heat-Treatment of High-Speed Steel. II. Heating High-Speed Steel for Hardening. S. G. Cope. *Metal Treatment and Drop Forging,* v. 21, Feb. 1954, p. 67-74.

Heating process for hardening high speed steel and influence of condition prior to this treatment on final properties. Distribution and nature of carbides and various factors influencing carbide solution and grain size, indicating how mechanical properties are affected by them. Graphs. (J26, Q general, TS)

114-J. Tools for the Heat Treater. A. H. Koch. *Tool Engineer,* v. 32, Mar. 1954, p. 45-53.

Furnaces, furnace equipment and operating procedures including heating cycles, delayed and interrupted quenching and use of protective atmospheres. Photographs, table, diagrams. (J general)

115-J. Commercial Annealing and Quenching Plus Tempering of Cold-Drawn Steel Bars With Special Consideration of Scaling, Decarburization, Heating Rate and Temper Brittleness. I. Annealing Before and After Cold Drawing. W. Hülsbruch. *Henry Brutcher, Altadena, Calif., Translation no.* 2570, 19 p. (From *Stahl und Eisen,* v. 70, no. 15, 1950, p. 641-647.)

Previously abstracted from original. See item 220-J, 1950. (J23, J29, ST)

K

Joining

182-K. High-Temperature Brazing. G. D. Cremer, F. J. Filippi and R. S. Mueller. *Aircraft Production,* v. 16, Feb. 1954, p. 76-81.

Application of corrosion and heat resistant alloys to the fabrication of sheet-metal assemblies. Photographs. (K8)

183-K. Bonding Methods for Adhering Rubber to Metal. J. H. Gerstenmaier. *American Society of Tool Engineers, Technical Papers and Panel Discussion,* v. 21, 1953, 11 p.

Types of adhesions, design features and a method for determining quality levels. Photographs, drawings, tables. (K11)

184-K. Manufacturing Applications for Metal Stitching. Arthur G. Denne. *American Society of Tool Engineers, Technical Papers and Panel Discussion,* v. 21, 1953, 18 p.

Advantages, limitations and standard manufacturing applications. Photographs, drawings, table. (K13)

185-K. Properties, Processing and Uses of Metal-Bonding Adhesives. O. W. Loudenslager. *American Society of Tool Engineers, Technical Papers and Panel Discussion,* v. 21, 1953, 13 p.

Physical properties and sandwich materials with their present and future uses. Photographs, drawings, tables. 9 ref. (K12)

186-K. Solid State Bonding of Aluminum to Nickel. S. Storchheim, J. L. Zambrow and H. H. Hausner. *Journal of Metals,* v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Feb. 1954, p. 269-274.

Solid-state bonding of aluminum to nickel was studied as a function of temperature, pressure and time at pressure. Initial results indicated that as reaction conditions were varied, marked changes in tensile strength occurred. Diagram, graphs, photographs, micrographs. (K5, Q27, Al, Ni)

187-K. 6 Processes for Fusion Welding of Aluminum. Lester F. Spencer. *Welding Engineer,* v. 39, Feb. 1954, p. 58-62, 64, 66.

Oxy-acetylene, metal and carbon-arc, atomic-hydrogen, tungsten and metal inert-gas processes. Photographs, diagrams, tables. 12 ref. (K2, K1, Al)

188-K. (German.) **Fatigue Strength of Corner-Weld Joints.** *Brennstoff-Wärme-Kraft,* v. 6, no. 1, Jan. 1954, p. 22-24.

Experiments with four different types of joints. Photographs, diagrams, graphs. (K general, Q7)

189-K. (German.) **New Electric Welding and Soldering Gun.** J. C. Fritz. *Elektrotechnische Zeitschrift,* v. 6, Ausgabe B, no. 1, Jan. 21, 1954, p. 10.

Hard-soldering and argon and sigma-welding guns. Photograph. 5 ref. (K1, K7)

190-K. (German.) **Evaluation of the Progressive Technique of Spot Welding.** K. Ruppin. *Metall,* v. 8, nos. 1-2, Jan. 1954, p. 30.

Principles and weldability of different metals. Tables, graphs. (K3)

191-K. (German.) **Repairing Cast-Iron Parts by Welding.** Hans Höll. *Schweissen und Schneiden,* v. 5, no. 12, Dec. 1953, p. 480-483.

Various methods of hard soldering and welding. Diagrams, photographs. (K7, K1, K2, CI)

192-K. (German.) **Electric Arc Welding Under Protection of Rare Gases.** Wilhelm Mantel and Lothar Wolff. *Schweisstechnik,* v. 7, no. 12, Dec. 1953, p. 133-142.

Advantages, procedure, equipment and application. Shows that a-c. welding with ordinary transformers is not satisfactory with this process. Tables, photographs, diagrams, graphs. (K1)

193-K. (German.) **Condenser-Impulse Welding.** Fr. Früngel and W. Thorwart. *VDI Zeitschrift des Vereines deutscher Ingenieure,* v. 96, no. 1, Jan. 1, 1954, p. 18-21.

Advantages, design and results. Photographs, diagrams, graphs. 2 ref. (K6, ST, Ag, Cu, Fe, W, Al)

194-K. (German.) **Inductive Welding of Pipe Seams and Its Application.** E. Hörmann. *VDI Zeitschrift des Vereines deutscher Ingenieure,* v. 96, no. 3, Jan. 21, 1954, p. 65-72.

Production and joining of pipes. Pressure and temperature requirements. Graphs, photographs, diagrams, micrographs. (K6)

195-K. Tests of Electric Flash Butt-Welded Rails. R. E. Cramer and R. S. Jensen. *American Railway Engineering Association, Bulletin,* v. 55, no. 514, Feb. 1954, p. 684-694.

Rolling-load and physical tests. Tables, photographs. (K3, CN)

196-K. New Developments in Sigma Welding of Carbon Steels. II. T. McElrath and R. T. Telford. *Canadian Metals,* v. 17, Feb. 1954, p. 34, 36, 38.

From paper presented at Annual Meeting of the AWS, 1953. Report covers three years of research, development and commercial exploitation of the sigma-process as applied to the welding of carbon steel. Tables, drawings. 3 ref. (K1, CN)

197-K. Atomic Hydrogen in the Research Laboratory. R. L. F. Boyd and N. D. Twiddy. *Electronic Engineering,* v. 26, Feb. 1954, p. 78-79.

Instrument employing a radiofrequency corona to produce dissociation in welding and brazing. Photographs, diagram. (K1, K8)

198-K. Vaporized Flux for Bronze Welding. *Machinery Lloyd (Overseas Ed.),* v. 26, Jan. 30, 1954, p. 107-108.

Method provides uniform and easily regulated flow of flux. Diagram. (K8, Cu)

199-K. Evolution of Hydrogen From Weld Metal. K. Winterton and C. L. M. Cottrell. *Metallurgia,* v. 49, no. 291, Jan. 1954, p. 3-7.

Hydrogen evolving at room temperature from freshly made steel weld metal can be measured by a simple displacement method. Values of evolved hydrogen are quoted for 19 electrodes. Photographs, tables, graphs. 4 ref. (K1, ST)

200-K. The Cold Pressure Welding of Metals. J. E. Hughes. *Metallurgia,* v. 49, no. 291, Jan. 1954, p. 15-19.

Using a method of cold welding cylindrical rod specimens in which deformation may be confined to interfacial zone, weldabilities of aluminum, copper and iron have been studied. Diagrams, tables, photograph, micrographs. 7 ref. (K5, Al, Cu, Fe)

201-K. Shielded-Tungsten Arc Welding. H. A. Huff, Jr., and A. N. Kugler. *Product Engineering,* v. 25, Feb. 1954, p. 170-174.

Equipment, jigging, shielding gases, joint design and various weldable metals. Photographs. (K1)

202-K. The Use of Solder Paint in Container Manufacture. G. Taylor. *Sheet Metal Industries,* v. 31, no. 322, Feb. 1954, p. 123-124, 128.

A strip of paint 1/16 in. wide applied where required provided enough solder to sweat the side seam of a can. Drawings. (K7)

203-K. The Twin-Arc Welding Process. W. D. Waller. *Sheet Metal Industries,* v. 31, no. 322, Feb. 1954, p. 131-135.

Fast, low-cost process to meet initial high costs of automation. Tables, photographs, diagram. (K1)

204-K. Sigma Welding of Carbon Steel. T. McElrath and R. T. Telford. *Steel,* v. 134, Feb. 22, 1954, p. 104-106.

From a paper presented at the Annual Meeting, AWS, Fall, 1953. With porosity problems well on the way to solution, inert-gas metallic-arc process stands to move more rapidly into fields dominated by coated-electrode welding. Photograph, graph, diagrams, radiographs, table. (K1, CN)

205-K. Aspects of Welding Research in British Merchant Shipbuilding. II. R. B. Shepheard. *Welding and Metal Fabrication,* v. 22, Feb. 1954, p. 69-76.

Development of weldable alloys for marine use and structural tests on welded and riveted ships. Photographs, diagrams. 28 ref. (K9)

206-K. (Dutch.) **Fifteen Years of Electrode Production.** G. Westen-

dorp. *Smit Mededelingen,* v. 8, no. 4, Oct.-Dec. 1953, p. 138-140.

Reviews work carried out in connection with welding problems. Photograph, micrograph. (K1, T5)

207-K. (French.) **Preparation of Thin Layers on a Tantalum Support. Technique in Obtaining Highly Adhesive Thermal Deposits and Fixation of Tantalum to Copper by Brazing.** P. Garin, P. Léger and P. Prugne. *Journal de physique et le radium,* v. 15, no. 1, Jan. 1954, p. 45A-46A.

Method of applying tantalum foil to iron and copper used as target supports in Van de Graff experimentation. 12 ref. (K8, Cu, Fe, Ta)

208-K. (French.) **Distribution of Gases in Oxy-Acetylene Cutting and Welding.** *Métallurgie et la construction mécanique,* v. 85, no. 12, Dec. 1953, p. 981, 983-984.

Rational use and economy of gases in welding. Photographs, diagram. (K2, G22)

209-K. (German.) **Strength Tests of Bonded Light Metal Joints.** P. Brenner and A. Matting. *Aluminium,* v. 30, no. 1, Jan. 1954, p. 3-9.

Strength and stress distributions were studied for static and dynamic loads on monocoque structures. Graphs, photographs, tables. 6 ref. (K9, Al)

210-K. (Swedish.) **OK R3 and OK R6. New Basic Stainless Steel Electrodes.** T. Hellerström. *Svetsaren,* v. 18, no. 3, 1953, p. 36-39.

Welding properties of eight different austenitic, ferritic and ferritic-austenitic electrodes. Tables, photographs. (K1, T5, SS)

211-K. Welding Operations in Hydro-Electric Plant. A. N. G. Bray. *Australasian Engineer,* 1954, Jan. 1, p. 52-57.

Welding requirements for water turbine, hydraulic gate and penstock construction. Diagrams. (K general)

212-K. The Development of Metal-Arc Welding and Electrodes During the Past Half-Century. E. Flintham. *British Welding Journal,* v. 1, Jan. 1954, p. 3-10.

Early types of electrodes and arc welding processes. Reviews progress of metal-arc welding, with its successes and failures and post-war development. Diagrams, photographs, graph, table. 5 ref. (K1)

213-K. The Welded Structure in a Pump-House Foundation. Harold Smith. *British Welding Journal,* v. 1, Jan. 1954, p. 13-25.

Shop fabrication and site assembly of a mild steel structure which constitutes the shoe of a reinforced-concrete caisson. Component parts of the shoe are analyzed from structural as well as site-welding points of view. Diagrams, photographs. (K general, CN)

214-K. Effect of Steel Quality on Spot-Welding Properties. J. E. Roberts and H. E. Dixon. *British Welding Journal,* v. 1, Jan. 1954, p. 27-35.

Experiments to determine differences in spot weldability between five grades of 18 S.W.G. low-carbon steel, of deep or extra deep drawing quality. Tables, graphs, photographs. (K3, CN)

215-K. The Use of Self-Adjusting Arc Equipment for Welding a Light-Alloy Deckhouse. P. T. Houldcroft and H. E. Dixon. *British Welding Journal,* v. 1, Jan. 1954, p. 36-44.

First application of process in what is likely to be one of its more important fields. Practical details and recommendations. Report is of particular interest in that all welding was carried out in the open. Diagrams, photographs, photomacrographs, table. 5 ref. (K1, Al)

216-K. Automatic Submerged Arc Saves 60% When Rebuilding Worn Equipment. Ivan R. Bartter. *Industry & Welding,* v. 27, Mar. 1954, p. 37-40, 68, 70-71.

Process is faster and quality of welds produced is superior to hand welds. Photographs. (K1)

217-K. "Slope Control" Lengthens Tip Life and Improves Weld Quality. Chas. Bruno. *Industry & Welding,* v. 27, Mar. 1954, p. 44-46, 67.

Spot welding of aluminum with conventional single-phase alternating current type welders. Tables, oscillograms. (K3, Al)

218-K. How to Weld Aluminum-Bronze to Steel. Lowell H. Hawthorne. *Industry & Welding,* v. 27, Mar. 1954, p. 50-52, 54.

Copper alloys and steel are often welded together to secure economy, structural strength and corrosion resistance. Photograph, diagram. (K general, Al)

219-K. How to Interpret Weld Radiographs. *Industry & Welding,* v. 27, Mar. 1954, p. 58-62, 64-66.

Brief account of some factors which have to be considered in interpreting radiographs of welds made by various electric-arc processes in steels. Radiographs. (K1, S13, ST)

220-K. "Faster Fusion". William P. Brotherton. *Modern Industrial Press,* v. 16, Feb. 1954, p. 24, 28, 30, 58.

Fusion welding jigs and procedures. Welding by inert gas-shielded and submerged-arc methods. Photographs. (K1)

221-K. Metal to Non-Metal Brazing. *Metal Treatment and Drop Forging,* v. 21, Feb. 1954, p. 66.

Materials and techniques. (K11)

222-K. Arc Welding Flanged Shells. Donald F. Baumler. *Modern Machine Shop,* v. 26, Mar. 1954, p. 150-155.

Both automatic and semi-automatic submerged-arc equipment employed in making longitudinal and girth joints. Photographs, diagram. (K1, CN)

223-K. A Technique of Soldering to Thin Metal Films. Richard B. Belser. *Review of Scientific Instruments,* v. 25, Feb. 1954, p. 180-183.

Use of indium and certain of its alloys as a solder, without a flux. Adherence to thin metal films may be readily obtained without destruction of the film. Tables, micrographs. 6 ref. (K7, In)

224-K. The Welding of Nickel and High Nickel Alloys. Lester F. Spencer. *Sheet Metal Worker,* v. 45, Feb. 1954, p. 65-66, 68, 70.

Jigs and factors influencing selection of welding methods. Diagrams, tables, photograph. (To be continued.) (K general, Ni)

225-K. Modern Welding of Aircraft Components. W. P. Brotherton. *Steel Processing,* v. 40, Feb. 1954, p. 92-96, 115.

Five basic types of shielded-arc welding in general use. Photographs. (K1)

226-K. Effect of Polyphase Motors on the Voltage Regulation of Circuits Supplying Three-Phase Welder Loads. Max A. Faucett, Marvin Fisher, Jr., and M. Stanley Helm. *University of Illinois Bulletin (Engineering Experiment Station Bulletin Series no.* 418), v. 51, no. 19, Oct. 1953, 42 p.

Problem of light flicker caused by operation of an arc welder. Graphs, tables, diagrams oscillograms. (K1)

227-K. Outstanding Welding Repairs to the Base of a 5,000-Ton Press. J. K. Mortimer. *Welder,* v. 22, Oct.-Dec. 1953, p. 103-107.

Equipment and techniques employed. Diagrams, photographs. (K general, CI)

228-K. Spotlight on Arc Welding. VIII. Sterling Foundry Specialties Ltd., Bedford. *Welder,* v. 22, Oct.-Dec. 1953, p. 108-111.

Equipment, techniques and applications, Photographs. (K1)

229-K. Welding as an Aid to Repairs and Maintenance in a Gas Works. *Welder,* v. 22, Oct.-Dec. 1953, p. 112-114.

Applications of repair welding. Photographs. (K general)

230-K. High-Frequency Butt Welding of Pipes for Steam Coils. Clyde B. Clason. *Welding Engineer,* v. 39, Mar. 1954, p. 24-26.

Equipment and techniques employed. Photographs. (K6)

231-K. 77 Years of Resistance Welding. II. Preston M. Hall. *Welding Engineer,* v. 39, Mar. 1954, p. 36-37.

Reviews early developments in equipment and procedures. Photographs. (To be continued.) (K3)

232-K. Plain Tips on Plain Steels. Lester F. Spencer. *Welding Engineer,* v. 39, Mar. 1954, p. 38-42.

Equipment, techniques and problems of arc welding plain carbon steels. Photographs, tables, graph. 4 ref. (K1, CN)

233-K. Testing High-Strength Silver-Brazing Alloys. Karl M. Weigert. *Welding Engineer,* v. 39, Mar. 1954, p. 44-45.

Shear and tensile tests. Diagram, graphs. 8 ref. (K8, Q2, Q27, Ag)

234-K. Fabrication of a Zirconium-Lined Reaction Vessel. O. G. Paasche and A. J. Killin. *Welding Journal,* v. 33, Feb. 1954, p. 115-118.

Welding of zirconium is accomplished by inert-gas-shielded process with protection by inert gas on the underside of the weld. Photographs, diagrams, table. (K12, Zr)

235-K. Silver and Gold for Brazing Electronic Components. A. W. Swift and R. J. Metzler. *Welding Journal,* v. 33, Feb. 1954, p. 119-123.

Alloys used for brazing various components employed in electronic industry. Photographs, tables. 6 ref. (K8, Au, Ag)

236-K. Arc Characteristics for Consumable-Electrode Gas-Shielded Welding. R. W. Tuthill. *Welding Journal,* v. 33, Feb. 1954, p. 128-132.

Experimental investigation of inert-gas-shielded metal arc in order to establish volt-ampere curves for different metals. Graphs, diagram, table, photograph. (K1)

237-K. New Development in Fluxes for Automatic Welding and Hard Surfacing. L. K. Stringham. *Welding Journal,* v. 33, Feb. 1954, p. 132-136.

Advantages of mixing properly formulated finely ground particles of flux ingredients together with a proper binder and drying resultant agglomerate. Photographs. (K1, L24)

238-K. Study and Recommendation for the Welding and Brazing of Individual Diesel Locomotive Parts as Well as the Hardfacing of Wearing Parts. Otto Gier, chairman. Paper from "Official Proceedings of the 1953 Annual Meeting Master Boilermakers' Association", p. 101-113; disc., p. 120-124.

Includes photographs. (K general, L24)

239-K. (French.) **Production of Large-Diameter Steel Tubes by Welding.** O. L. Bihet. *Ossaturae metallique,* v. 18, no. 12, Dec. 1953, p. 622-625; disc., p. 625-627.

Presented at International Congress of Information Centers on Steel at Brussels. Belgian production of water and gas mains having a diameter larger than 250 mm. Photographs. (K general, ST)

240-K. Electrodes for the Welding of Acid-Resisting Cr-Ni-Mo-Ti Steels. G. A. Ukolov. *Henry Brutcher, Alta-*

dena, Calif., Translation no. 3188, 5 p. (From *Avtomaticheskaya Svarka,* v. 6, no. 3, 1953, p. 46-49.)

Favorable results obtained by addition of ferromanganese to coating of electrodes. Tables, photograph. 3 ref. (K1, AY, Cr, Ni, Mo)

241-K. (German.) **Resistance Welding.** A. Erker. *Schweissen und Schneiden,* v. 6, no. 1, Jan. 1954, p. 30-35.

Various methods of resistance welding. Diagrams, photographs, table. (K3)

242-K. (Spanish.) **Design of Welded Constructions.** F. Koenigsberger. *Ciencia y técnica de la Soldadura,* v. 3, no. 15, Nov.-Dec. 1953, 12 p.

Practical method of calculating characteristics and conditions. Diagrams, graphs. (K general)

243-K. (Spanish.) **Glass-Metal Union by Means of Plastic Adhesives Applied to the Production of Cathode-Ray Tubes.** R. Mearin. *Ciencia y técnica de la Soldadura,* v. 3, no. 15, Nov.-Dec. 1953, 4 p.

Experimental work on obtaining a glass-metal seal capable of supporting a vacuum of the order of 1×10^{-5} mm. mercury. Diagrams. (K11)

244-K. (Spanish.) **Influence of Hydrogen and Silicon on Electric Arc Welding.** J. L. Zuloaga. *Ciencia y técnica de la Soldadura,* v. 3, no. 15, Nov.-Dec. 1953, 8 p.

Methods of evaluating hydrogen in steels. Apparatus used at the Instituo de la Soldadura, Madrid. Diagrams. 17 ref. (K1, ST)

245-K. (Book.) **Welding Engineering.** Boniface E. Rossi. 786 p. 1954. McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y. $8.00.

Fundamental facts about welding for the beginner and reference source for designers. Covers the various welding processes, metallurgy of welding and weldability of various metals, design and fabrication considerations, testing and inspection of welds, and appendices covering engineering data, definitions, bibliography and problems. (K general)

L

Cleaning, Coating and Finishing

262-L. Carbide Flame-Plating. W. L. Donnelly. *American Society of Tool Engineers, Technical Papers and Panel Discussion,* v. 21, 1953, 5 p. + 3 plates.

Coatings from 0.0005 to 0.020 in. thick are currently being applied to a wide variety of base metals, including hardened toolsteels, copper, brass, aluminum and titanium. (L23)

263-L. Thirty Years' Experience in Testing Aluminum Paint Performance. Robert I. Wray. *Corrosion,* v. 10, Feb. 1954, p. 50-58.

Results achieved with coatings of various kinds, including different formulations of aluminum paint on steel and aluminum bases. Photographs. (L26, R11, Al)

264-L. The Use of Organic Protective Coatings in Controlling Corrosion. Edward G. Bobalek. *Corrosion,* v. 10, Feb. 1954, p. 73-81.

Composition, preparation and application of organic coatings. Mechanism by which coatings retard corrosion and relative value of barrier and polarizing coatings. Graph, tables. 2 ref. (L26, R general)

265-L. Hot Spray Lacquering Naval Aircraft. William A. Gottfried. *Finish,* v. 11, Feb. 1954, p. 29-31, 82.

Surface preparation, metal conditioning, priming and lacquering. Diagram, tables. (L26)

266-L. Adherence Tests for Porcelain Enamels and High Temperature Ceramic Coatings. II. Application of Standard PEI Adherence Test to High Temperature Coatings. George Warren. *Finish,* v. 11, Feb. 1954, p. 53-54.

Results of experimental studies. Tables, photographs. (L27, Ni, SS, CN)

267-L. Electrostatic Detearing Improves Dip-Coating Quality. J. J. Obrzut. *Iron Age,* v. 173, Feb. 4, 1954, p. 153-155.

Smooth, uniform coatings are obtained on dip-coated parts by removing paint tears and fatty edges electrostatically. Photographs. (L26)

268-L. Some Aspects of High Speed Litho Coating. C. H. Groff. *Modern Lithography,* v. 22, Feb. 1954, p. 85, 87, 89.

Equipment and techniques involved. (L26)

269-L. How Chemical Cleaning Makes Money. J. T. Browning. *Petroleum Refiner,* v. 33, Feb. 1954, p. 131-132.

Case history of profitable application of chemical cleaning to restoration and cleaning of entire section of refinery. Photographs, diagram. (L12)

270-L. Radiometric Study of Supplementary Chromate Coatings for Zinc and Cadmium Plating. Stanley L. Eisler, Jodie Doss and Mary Ann Henderson. *Plating,* v. 41, Feb. 1954, p. 147-154.

Radiosulfur and radiochromium were used to determine amounts of sulfate and chromium contained in coatings produced from various supplementary dip solutions. Tables. 5 ref. (L17, L16, S19, Zn, Cd)

271-L. Project no. 13: The Nature, Cause and Effect of the Porosity in Electrodeposits. I. The Porosity of Electrodeposits. Fielding Ogburn and Asaf Benderly. *Plating,* v. 41, Feb. 1954, p. 169-173.

Results of experimental studies. Tables, photographs. (L17)

272-L. Electroplating Plants Surveyed: Bright Nickel Plating. *Product Finishing,* v. 7, Jan. 1954, p. 66-70.

Equipment, plant layout and operating procedures. Photographs, table. (L17, Ni)

273-L. Flame Spraying Ceramics. Thomas A. Dickinson. *Products Finishing,* v. 18, Feb. 1954, p. 32, 34, 36.

Technique which may permit application of heat resistant ceramic coatings on materials like aluminum, magnesium and titanium as well as iron and steel products. Photographs. (L27, Al, Mg, Ti, Fe)

274-L. Automatic Process Control in Metal Plating. Leo Walter. *Products Finishing,* v. 18, Feb. 1954, p. 42-46, 48, 50, 52.

Practical considerations necessary for automation design. Photographs, diagrams. 1 ref. (L17, S18)

275-L. Protective Coating Fundamentals for Southern Industry. Raymond B. Seymour. *Southern Chemical Industry,* v. 6, Jan.-Feb. 1954, p. 6-8, 11-12.

Importance of application procedures. Photographs, table. (L general)

276-L. Anticorrosive Pigments. Arnold J. Eickhoff. Paper from "Organic Protective Coatings". Reinhold Publishing Corp. p. 61-80.

Four theories on the mechanism of corrosion. Photographs, graphs, tables, diagrams. 37 ref. (L26, R1)

277-L. Metal Protection With Synthetic Resin Coatings. E. E. McSweeney. Paper from "Organic Protective Coatings". Reinhold Publishing Corp. p. 304-321.

Four general factors affect ability of an organic coating to protect metal from corrosion. Their influence on formulation, application and performance of protective coatings. Micrographs, photograph, graphs, tables. 14 ref. (L26, R1)

278-L. Diffusion Coatings. D. M. Dovey, I. Jenkins and K. C. Randle. Paper from "Properties of Metallic Surfaces, Symposium". Institute of Metals, Monograph and Report Series 13. Institute of Metals, p. 213-236; disc., p. 295-364.

Mechanism involved in cementation processes in relation to adsorption and diffusion of the coating element. Photographs, graphs, table, micrographs. 27 ref. (L15)

279-L. The Nature and Properties of the Anodic Film on Aluminium and Its Alloys. H. W. L. Phillips. Paper from "Properties of Metallic Surfaces, Symposium". Institute of Metals, Monograph and Report Series 13. Institute of Metals, p. 237-252; disc., p. 295-364.

Film is hard and possesses little ductility, is translucent or transparent and is a good electrical insulator. Graphs, micrograph, spectrograms, table. 57 ref. (L19, Al)

280-L. (German.) **Rapid Control of Electrolytes Used in Precipitation of Metals. Effect of Fluorine in Zinc-Sulfate Solutions.** E. Bertorelle. *Metalloberfläche,* Ausgabe B, v. 6, no. 1, Jan. 1954, p. 2-5.

Use of triangular cell for determining composition and impurities in electrolytes by measuring flow of electric current. Table, graphs, micrographs, diagram, photograph. 4 ref. (L17)

281-L. (German.) **Further Development of the Technique of Metal Spraying.** Hans Reininger. *Metalloberfläche,* Ausgabe B, v. 6, no. 1, Jan. 1954, p. 6-11.

Literature review. Dickinson's process in which metal spray is concentrated on electrostatic fields, Hartmann's ultrasonic sprayer and Ballhausen's centrifugal metal sprayer. Photographs, diagrams, micrographs. 34 ref. (To be continued.) (L23)

282-L. Abrasion Resistance of Some Dry-Process Enamels. William C. Spangenberg. *American Ceramic Society, Journal,* v. 37, Feb. 1954, p. 48-51.

Resistance to abrasion of some dry-process cast iron enamels was investigated using the new weight-loss method of testing abrasion resistance now under development by the Porcelain Enamel Institute. Graphs, tables. 4 ref. (L27, Q9, CI)

283-L. Bond Failures in Babbitted Bearings. A. H. Lewis. *Canadian Metals,* v. 17, Feb. 1954, p. 40, 42, 44.

Investigation shows that rate of cooling and direction of casting are important variables in obtaining satisfactory bonds. Tables. (L16)

284-L. Tumbling or Barrel Finishing. H. Cox. *Canadian National Research Council, Technical Information Service Report no.* 33, Nov. 1953, 10 p.

Various finishing processes, media, compounds, equipment and operation. 28 ref. (L10)

285-L. East Anglian Founders Install Enamelling Plant. *Foundry Trade Journal,* v. 96, Feb. 4, 1954, p. 135-138.

Equipment, plant layout and operating procedures. Diagram, photographs. (L27)

286-L. How We Paint Steel Equipment for Stores. Les Slikkers. *Industrial Finishing*, v. 30, Feb. 1954, p. 26-28, 30, 32.

Metal cleaning and surface preparation operations. Photographs. (L26)

287-L. Dry Lubricant Film Put on Like Enamel. A. E. Brown. *Industrial Finishing*, v. 30, Feb. 1954, p. 50-52, 54, 56.

Coating material is a mixture of thermosetting resins, graphite and other ingredients which are compounded to provide specialized lubricative properties. Photographs. (L26)

288-L. Bright Plating Processes. *Industrial Finishing (London)*, v. 6, Jan. 1954, p. 413-421.

Review of processes for bright deposition of copper, zinc, nickel, white brass and chromium, which can materially help to lower production costs and reduce polishing and buffing times. Table, graph. (L17, Cu, Zn, Ni)

289-L. Metal Finishing. *Iron Age*, v. 173, Feb. 18, 1954, p. 165.

Corrosion resistant coating using phosphorus alloyed with nickel has advantages of stainless steel. (L14, Ni)

290-L. Maintenance Painting. T. A. Banfield. *Industrial Finishing (London)*, v. 6, Jan. 1954, p. 426-432.

Various corrosion conditions with applicable methods of prevention. Graph. (L26)

291-L. Mechanized Hard Chrome Plating Setup Is Fast and Efficient. Herbert Chase. *Iron Age*, v. 173, Feb. 18, 1954, p. 150-151.

Equipment and operating characteristics. Photograph. (L17, Cr)

292-L. Effect of Rust and Environment on Inhibition by Zinc-Rich Paints. J. E. O. Mayne. *Iron and Steel Institute, Journal*, v. 176, Feb. 1954, p. 140-143.

Paint films containing 96% zinc dust are capable of protecting rusty surfaces against corrosion by sea or rain water. Graphs, tables. 6 ref. (L26, R10, Zn)

293-L. Atmospheric Exposure Tests With Zinc-Rich Polystyrene Paints. J. E. O. Mayne. *Iron and Steel Institute, Journal*, v. 176, Feb. 1954, p. 143-146 + 1 plate.

Experimental methods and results. Table, photographs, graphs. (L26, R3, Zn)

294-L. New Epoxy Primer Has High Resistance to Alkalies. H. L. Farber. *Materials & Methods*, v. 39, Feb. 1954, p. 93-95.

Advanced flow coating technique combined with new primer permits thinner film thickness and improves corrosion resistance three times. Photographs. (L26)

295-L. Vacuum Metallizing Reduces Finishing Costs. *Materials & Methods*, v. 39, Feb. 1954, p. 108-109.

Equipment and techniques. Photographs. (L25)

296-L. Descaling the Stainless Steels. Lester F. Spencer. *Metal Finishing*, v. 52, Feb. 1954, p. 54-59.

Equipment and techniques employed in mechanical and acid descaling operations. Photographs, graphs, table. 6 ref. (L10, L12, SS)

297-L. Complex Cuprous Cyanide Compounds. Gunnar Gabrielson. *Metal Finishing*, v. 52, Feb. 1954, p. 60-64, 75.

Various alkali cuprous cyanides with special reference to electroplating field. Graphs, table. 22 ref. (L17, Cu)

298-L. Surface Preparation by Blast Cleaning Prior to Electroplating. Victor F. Stine. *Metal Finishing*, v. 52, Feb. 1954, p. 65-71.

Equipment, techniques, advantages and limitations. Diagrams, chart, photographs. (L10, L17)

299-L. Clad Metals for Stampings. Ernest C. Morse. *Modern Industrial Press*, v. 16, Feb. 1954, p. 44, 46, 48, 50, 52.

Discussion of clad plate, including bonding, forming and applications. Diagrams, photographs. (L22)

300-L. Paint and Corrosion. *Paint Manufacture*, v. 24, Feb. 1954, p. 61-62.

Electrical measurements in study of paint coatings on metal and mechanism of protection by paints. (L26, R11)

301-L. Surface Treatment and Finishing of Light Metals. VIII. S. Wernick and R. Pinner. *Sheet Metal Industries*, v. 31, no. 322, Feb. 1954, p. 115-122, 128.

Vitreous enameling of light alloys. Tables, graphs. 20 ref. (To be continued.) (L27, Al)

302-L. Controlled Hot Dip Galvanizing. II. K. S. Frazier. *Steel*, v. 134, Feb. 22, 1954, p. 102-103.

Length of submersion is vital question. Photographs, graphs. (To be continued.) (L16, Zn, CN)

303-L. New Aluminum Hard Surfacing Process Gives Hard, Abrasion Resistant Coating. A. Edward Zezula and John B. Franklin. *Western Metals*, v. 12, Feb. 1954, p. 53-55.

Mechanical properties of anodized castings. Photographs. (L19, Q general, Al)

304-L. (Dutch.) **The Effect of Accelerators in Phosphatizing.** E. J. Vollers. *Metalen*, v. 8, no. 23, Dec. 15, 1953, p. 415-418.

Various methods of accelerating phosphatizing process with aid of nitrates, nitrites and chlorates. Electrical and mechanical methods. Tables, graphs. 2 ref. (L14)

305-L. (German.) **Practical Experiences in Metallizing of Plastic Articles.** L. Hiesinger. *Kunststoffe*, v. 43, no. 12, Dec. 1953, p. 547-548.

High-vacuum technique. (L25)

306-L. (Russian.) **Influence of the Adsorption of Cations on the Electrodeposition of Copper from Pyrophosphate Electrolytes.** E. A. Ukshe and A. I. Levin. *Doklady Akademii Nauk SSSR*, v. 92, no. 4, Oct. 1, 1953, p. 799-801.

Measurements of cathode potentials of copper in presence of additions of tetrabutyl ammonia iodate to electrolyte showed increased polarization. Table, graphs. 5 ref. (L17, Cu)

307-L. (Russian.) **Low Alloy Steel for the Facing of Hydroturbine Blades.** I. R. Krianin and G. I. Babushkina. *Liteinoe Proizvodstvo*, 1954, no. 1, Jan.-Feb. p. 2-5.

Results of laboratory and industrial tests show that 20 GS-L steel meets mechanical and fatigue strength requirements. Tables, graphs, micrographs. 4 ref. (L24, Q7, AY)

308-L. An Introduction to Throwing Power and Covering Power in Electroplating Solutions. II. Effect of Operating Conditions on Throwing and Covering Power. R. Pinner. *Electroplating and Metal Finishing*, v. 7, Feb. 1954, p. 49-53, 59.

Effects of current density, pH, temperature, agitation, addition agents and surface structure. Graphs, tables. 42 ref. (L17, Cr, Cu, Ni, Zn)

309-L. Depreciation and Maintenance of Metal Finishing Plant. I. Modern Methods of Computation and Accounting. S. Howard Withey. *Electroplating and Metal Finishing*, v. 7, Feb. 1954. p. 54-55.

Detailed analysis of factors influencing depreciation and maintenance and various methods of computing costs. (To be continued.) (L general, A4, A5)

310-L. Adhesion and Surface Preparation in Protective Metal Spraying. I. J. M. Cowan. *Electroplating and Metal Finishing*, v. 7; *Metal Spraying*, v. 4, Feb. 1954, p. 79, 81-82.

Reviews adhesion of sprayed metal coatings. Methods of measuring adhesion quantitatively, influence of surface preparation and spraying conditions on adhesion and various types of grit and sand blasting equipment. Diagrams, tables. (To be continued.) (L23, L10)

311-L. A Plant for Applying Vitreous Enamel to Aluminum. J. M. Steele. *Finish*, v. 11, Mar. 1954, p. 38-40, 66.

Detailed layout, outline of equipment requirements and brief review of application routine. Diagram. (L27, Al)

312-L. The History of Phosphatizing. L. K. Schuster. *Finish*, v. 11, Mar. 1954, p. 45-46, 68-69, 82.

Historical discussion of subject of growing importance to all manufacturers of fabricated sheet metal products. (L14, CN)

313-L. Protective Coatings and Linings for Water Treating Equipment. James Boyd Smith. *Organic Finishing*, v. 15, Feb. 1954, p. 13-15.

Coatings for degasifier units and filtration, coagulation and chemical feeding equipment. 14 ref. (L general)

314-L. Recent Developments in Silicone Vehicles for Maintenance Paints. R. C. Hedlund. *Organic Finishing*, v. 15, Feb. 1954, p. 16-18.

Fast-drying silicone vehicle, silicone-alkyd co-polymer and modified silicone-alkyd resins. Photographs, tables. (L26)

315-L. Statistical Quality Control of Plating Solutions. A. D. Woodell. *Product Finishing*, v. 7, Feb. 1954, p. 48-52, 112.

Includes graphs. (L17, S12)

316-L. Choosing Your Paint. E. Johnson. *Product Finishing*, v. 7, Feb. 1954, p. 53-58, 108, 110.

Factors to be considered, including suggestions for various tests that can be applied for checking quality of paints. (L26)

317-L. Technical Problems in the Finishing Shop. Barrel Plating Considerations. E. E. Halls. *Product Finishing*, v. 7, Feb. 1954, p. 61-72, 112.

General considerations in employment of this process. Diagrams. (L17)

318-L. The Scope of Slidabrading. *Product Finishing*, v. 7, Feb. 1954, p. 73-76.

Details of new tumbling process. Diagrams, table, photographs. (L10)

319-L. Liquid Honing in Russia. *Product Finishing*, v. 7, Feb. 1954, p. 80-83.

Recently installed plant for cleaning castings by jets of liquid mixed with abrasive material and directed on to the work surface by compressed air. Diagrams, tables. (L10)

320-L. Review of Electroplating Plant. II. *Product Finishing*, v. 7, Feb. 1954, p. 84-90.

Representative selection of anodes, jigs and polishing machines. Photographs, table. (L17)

321-L. Hot Dip Galvanizing. II. Control of Dross Formation. K. S. Frazier. *Steel*, v. 134, Mar. 1, 1954, p. 98-99.

Controls of timing temperature and cleanliness of work automatically improve uniformity and product quality. Photograph, diagram, graphs. (L16, Zn, CN)

322-L. Wire Galvanizing Techniques in the U. S. A. *Wire Industry*.

v. 21, Feb. 1954, p. 155, 157, 161-162, 170.

Plant equipment and procedures. Diagrams, photograph. (L16)

323-L. Kinetics of Coating Phenomena, in Particular of Phosphating Process. W. Machu. *Henry Brutcher, Altadena, Calif. Translation no.* 2806, 21 p. (From *Archiv für Metallkunde*, v. 3, no. 6, 1949, p. 203-208.)

Previously abstracted from original. See item 7B-182, 1949. (L14, CN)

324-L. Recommended Practices for the Cleaning, Inspection and Testing of Steam Generator Coils to Determine Their Condition and Eliminate Failure. Andrew J. Ritter, chairman. Paper from "Official Proceedings of the 1953 Annual Meeting Master Boiler Makers' Association", p. 52-57; disc., p. 57-66. (L10, L12)

325-L. Study and Recommendation for the Washing and Cleaning of Diesel Locomotive Water Tanks. F. E. Godwin, chiarman. Paper from "Official Proceedings of the 1953 Annual Meeting Master Boilermakers' Association", p. 75-82; disc., p. 83-86. 1953. (L12)

326-L. (Dutch.) **Organic Coatings for Corrosion Protection.** T. van der Klis. *Bedrijf en Techniek*, v. 9, no. 195, Jan. 30, 1954, p. 50-53, 65.

Application and effectiveness of various organic coatings. Diagrams, tables. 5 ref. (L26)

327-L. (French.) **Continuous Strip Electrolytic Tinning.** M. W. de Laminne. *Ossature metallique*, v. 18, no. 12, Dec. 1953, p. 602-604; disc., p. 604-605.

Paper presented at International Congress of Information Centers on Steel at Brussels. Process of producing electrolytic tin plate. Photograph, diagrams. (L17, CN, Sn)

328-L. (German.) **The Preparatory Treatment of Metallic Surfaces Previous to Painting and the Latest Development in Cleaning and Preservation Practice.** Bernhard F. H. Scheifele. *Werkstoffe und Korrosion*, v. 5, no. 1, Jan. 1954, p. 5-10.

Importance of surface preparation for corrosion resistance and durability of organic protective coatings. 30 ref. (L26, L10, L12)

329-L. (Book.) **American Electroplaters' Society, Proceedings (Annual Volume),** v. 40, 1953. 154 p. American Electroplaters' Society, 445 Broad St., Newark, N. J.

Consists of 20 papers abstracted separately. (L17)

330-L. (Book—German.) **(Riedel's Handbook of Electroplating.) Riedel's Ratgeber der Galvanotechnik.** 2nd Ed. 320 p. 1952. Verlag Delius, Klausen and Co., Bielefeld u. Berlin. 6.80 D.M.

A general introduction to electroplating and related surface treatments. (L17)

M

Metallography, Constitution and Primary Structures

91-M. Constitution of Iron-Boron Alloys in the Low Boron Range. M. E. Nicholson. *Journal of Metals*, v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, Feb. 1954, p. 185-190.

Results of studies in solubility of boron in iron. Graphs, micrographs, tables, diagram, 10 ref. (M24, Fe)

92-M. Crystallographic Angles for Hexagonal Metals. A. Taylor and Sam Leber. *Journal of Metals*, v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, Feb. 1954, p. 190-192.

Interplanar angles are used to construct a stereographic projection. Tables, diagram. 4 ref. (M26)

93-M. Influence of Oxygen, Nitrogen, and Carbon on the Phase Relationships of the Ti-Al System. R. J. Van Thyne and H. D. Kessler. *Journal of Metals*, v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, Feb. 1954, p. 193-199.

Phase diagrams. Micrographic analysis of annealed high-purity arc-melted alloys was principal method of investigation, supplemented by X-ray diffraction. Graphs, micrographs, tables. 7 ref. (M24, M21, M22, Ti, Al)

94-M. Titanium-Chromium-Oxygen System. Chih-Chung Wang and Nicholas J. Grant. *Journal of Metals*, v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, Feb. 1954, p. 200-206.

Phase diagrams, diagrams, tables, micrographs, graphs. 17 ref. (M24, Ti)

95-M. Uranium-Titanium Alloy System. Murray C. Udy and Francis W. Boulger. *Journal of Metals*, v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, Feb. 1954, p. 207-210.

Preparation of alloys, fabrication, heat treatment, metallographic and X-ray examination and phases present. Micrographs, table, phase diagram. 2 ref. (M24, U, Ti)

96-M. A Cursory Investigation of Intermediate Phases in the Systems Ti-Zn, Ti-Hg, Zr-Zn, Zr-Cd, and Zr-Hg by X-Ray Powder Diffraction Methods. Paul Pietrokowsky. *Journal of Metals*, v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, Feb. 1954, p. 219-226.

Physical metallurgy of titanium and zirconium when alloyed with elements in subgroup II-B of periodic table. Tables. 15 ref. (M24, M22, Ti, Zn, Hg, Cd)

97-M. System Titanium-Manganese-Molybdenum. R. P. Elliott, B. W. Levinger and W. Rostoker. *Journal of Metals*, v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, Feb. 1954, p. 228-232.

Phase equilibria in Ti-Mn-Mo system investigated in composition range 100 to 60% titanium and in temperature range 500° to 1150° C. Phase diagrams, table. 7 ref. (M24, Ti, Mn, Mo)

98-M. Constitution and Properties of Ag-Cu-Zn Brazing Alloys. Karl M. Weigert. *Journal of Metals*, v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, Feb. 1954, p. 233-237.

Results of experimental studies on structure and mechanical properties. Micrograph, phase diagrams, graphs, table. 6 ref. (M24, Q general, Ag, Cu, Zn)

99-M. System Zirconium-Oxygen. R. F. Domagala and D. J. McPherson. *Journal of Metals*, v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, Feb. 1954, p. 238-246.

Results of experimental studies. Tables, diagram, micrograph. 18 ref. (M24, Zr)

100-M. The Sigma Phase in Binary Alloys. Peter Greenfield and Paul A. Beck. *Journal of Metals*, v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, Feb. 1954, p. 253-257.

Experimental data on conditions for sigma formation in a series of alloys. Tables. 28 ref. (M26, M24, V, Ni, Co, Mn, Cr, Fe, Mo, Nb, Ta, W)

101-M. An Investigation of the Systems Formed by Chromium, Molybdenum, and Nickel. David S. Bloom and Nicholas J. Grant. *Journal of Metals*, v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, Feb. 1954, p. 261-268.

Investigation of Cr-Mo-Ni ternary system and attendant binaries has been completed. Graphs, phase diagrams, table, micrograph. 7 ref. (M24, Co, Mo, Ni)

102-M. Highly Sensitive Dilatometer. *Metal Progress*, v. 65, Feb. 1954, p. 202, 204, 206, 208. (Digest of "Improved Precision Equipment for Metallurgical Analysis. I. Differential Transformer Dilatometer", L. L. Wyman, U. S. Atomic Energy Commission Report KAPL-654, available from Office of Technical Services, Dept. of Commerce, Washington 25, D. C. Price 20 cents.)

Experimental work in instrumentation. (M23)

103-M. Specialized Microscopical Techniques in Metallurgy. S. Tolansky. Paper from "Properties of Metallic Surfaces". Monograph and Report Series 13. Institute of Metals, London. p. 1-22; disc., p. 295-364.

General survey of the microscope as used for metallurgical studies. Micrographs. 10 ref. (M21)

104-M. (English.) **Microscopic Studies on Deformed ZnS-Crystals.** E. Votava, S. Amelinckx and W. Dekeyser. *Physica*, v. 19, no. 12, Dec. 1953, p. 1163-1172.

An optical and interferometric study was made of (111) faces of zinc sulfide crystals grown at relatively high temperature. Micrographs, diagrams. 9 ref. (M26)

105-M. (English.) **Interferometric Measurement of Grain Boundary Grooves.** S. Amelinckx, N. F. Binnendijk and W. Dekeyser. *Physica*, v. 19, no. 12, Dec. 1953, p. 1173-1177.

Use of multiple beam interferometry for measurements of the dihedral angle of the groove between grains of a polycrystalline metal aggregate. Micrographs, diagrams. 3 ref. (M27)

106-M. (Czech.) **Analyzing Nonmetallic Inclusions in Steel by Electrolysis and Chlorination Electrolytical Analysis of Steel Carbides.** Miroslav Sicha. *Hutnické Listy*, v. 9, no. 1, Jan. 1954, p. 2-11 + 2 plates.

Inclusions were separated from carbides by chlorinating them in a vacuum vessel. Sulfides were disengaged by electrolytical remainders and detected by special device. Diagrams, photographs, micrographs, table. 13 ref. (M23, S11, ST)

107-M. (German.) **The Analysis of Structural Components in Pig and Cast Iron.** Walter Koch and Joachim Bruck. *Archiv für das Eisenhüttenwesen*, v. 24, nos. 11-12, Nov.-Dec. 1953, p. 457-464; disc., p. 464.

Microscopic, X-ray and electrochemical studies. Technique. Tables, graphs, micrographs. 23 ref. (M21, CI)

108-M. (German.) **Metallographic Investigations of Nonmetallic Inclusions in Steel by a Novel Thin-Specimen Process.** Erich Folkhard. *Archiv für das Eisenhüttenwesen*, v. 24, nos. 11-12, Nov.-Dec. 1953, p. 519-522.

Specimens were ground fine and the metal matrix dissolved and examined under the microscope. Micrographs. 3 ref. (M21, ST)

109-M. (German.) **History and Status of Constitution Research. I. H.**

Spengler. *Metall,* v. 8, nos. 1-2, Jan. 1954, p. 24-25.

Research work on constitution of alloys to 1950. Tables, graphs. 4 ref. (M24)

110-M. (Italian.) **The Hume-Rothery Phases in Alloys With More Than Two Components. I. Composition of Hume-Rothery Phases in Alloys With More Than Two Components. II. Phases With a 7:4 Ratio in the Ni-Cu-Sn System. III. Phases With Ratios of 3:2 and 21:13 in the Ni-Cu-Sn System.** Francesco Mazzoleni. *Metallurgia italiana,* v. 45, no. 10, Oct. 1953, p. 363-373.

X-ray diffraction studies on alloys with various valence electron ratios. Diffraction spectra, diagrams. 21 ref. (M22, M24, Cu, Ni, Sn)

111-M. (Swedish.) **Grain-Size Charts for Ferritic and Austenitic Structures.** T. Berglund. *Jernkontorets Annaler,* v. 137, no. 11, 1953, p. 767-784.

New charts representing actual structures of ferrite, low-carbon steel and austenite. Relation between JKM and ASTM classifications for steels and copper alloys. Tables, graphs, micrographs. 6 ref. (M27, AY, Cu)

112-M. Direct Observations of Dislocations in Crystals. A. J. Forty. *Advances in Physics,* v. 3, Jan. 1954, p. 1-25 + 24 plates.

Detection, arrays of dislocations, evidence for movement and state of dislocation. Diagrams, micrographs. 69 ref. (M26)

113-M. Electron Diffraction Study of the Structures of Antimony Electrodeposited on Antimony Cleavage Face. Ling Yang. *Journal of Applied Physics,* v. 25, Feb. 1954, p. 184-188.

Various factors controlling crystal orientation in electrodeposited metals. Micrographs, diagrams, tables. 3 ref. (M26, Sb)

114-M. The Wustite Phase in Partially Reduced Hematite. Gust Bitsianes and T. L. Joseph. *Journal of Metals,* v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Feb. 1954, p. 150-153.

Study of the wüstite phase that had formed during partial reduction of a cylindrical compact of chemically pure hematite. Photograph, micrographs, graphs, table, spectrogram. 3 ref. (M27, Fe)

115-M. An Improved Method for Routine Electrolytic Polishing of Microspecimens. R. L. Hancher. *Metallurgia,* v. 49, no. 291, Jan. 1954, p. 47-51.

Experiments show that optimum polishing conditions, for a particular specimen, are dependent on voltage-resistance characteristics of cell. Diagrams, graph, photographs, micrographs. 5 ref. (M21)

116-M. (English.) **Transition Metal Diborides.** Benjamin Post, Frank W. Glaser and David Moskowitz. *Acta Metallurgica,* v. 2, no. 1, Jan. 1954, p. 20-25.

Structural characteristics of eight transition metal diborides. Extent of solid solubility appeared to depend mainly on size factors. Tables, diagrams. 14 ref.
(M26, Cr, V, Ti, Mo, Ta, Nb, Hf, Zr)

117-M. (English.) **Interstitial and Vacancy Migration in Cu_3Au and Copper.** J. A. Brinkman, C. E. Dixon and C. J. Meechan. *Acta Metallurgica,* v. 2, no. 1, Jan. 1954, p. 38-48.

Vacant lattice sites and interstitial atoms in excess of equilibrium concentrations have been introduced into alloy Cu_3Au by quenching rapidly from high temperatures and by irradiating with cyclotron particles. Graphs, tables. 21 ref.
(M25, Cu, Au)

118-M. (French.) **Orientation of Fine Substructure on Crystal Faces of Aluminum and Its Alloys as Observed in the Electron Microscope.** Pierre Bussy. *Comptes rendus,* v. 238, no. 2, Jan. 11, 1954, p. 247-249.

Attempts to establish nature of variation of orientation from one crystal to another. Micrographs. 3 ref. (M26, Al)

119-M. (French.) **Selective Oxidation of a Monocrystal of Alpha Brass.** Noboru Takahashi. *Comptes rendus,* v. 238, no. 4, Jan. 25, 1954, p. 462-463.

Oxidation of Cu_2O and ZnO studied by electron diffraction. Multiple reflection effect was noted in case of ZnO. Micrographs. 1 ref. (M22, R2, Cu)

120-M. (French.) **Heterogeneity of Copper Crystals Produced by Electrolytic Deposit on a Monocrystal of Electrolytically Polished Beta-Brass.** Noboru Takahashi. *Journal de chimie physique,* v. 50, nos. 11-12, Nov.-Dec. 1953, p. 624-628 + 1 plate.

Copper precipitated on plane (211) of beta-brass takes on hexagonal and face-centered cubic forms in the submicroscopic twinned state. Orientations between these crystals are explained. Phenomena studied by electron diffraction. Micrographs, table, diagrams.
(M26, N7, Cu)

121-M. (French.) **Properties of Iron Binary Alloys.** T. G. Owe Berg. *Journal de physique et le radium,* v. 15, no. 2, Feb. 1954, p. 99-100.

Systems formed by combining iron with elements of higher atomic numbers contain two phases characterized by different electron densities. 3 ref. (M24, Fe)

122-M. (Russian.) **Possible Development of the Dislocation Theory.** V. I. Arkharov, G. N. Kolesnikov and A. N. Orlov. *Doklady Akademii Nauk SSSR,* v. 92, no. 4, Oct. 1, 1953, p. 751-754.

Possibility of correcting the basic difficulty of modern dislocation theory. 2 ref. (M26)

123-M. (Swedish.) **Sigma Phase in Stainless Steel.** Stig-Erik Erikson. *Svetsaren,* v. 18, no. 3, 1953, p. 33-35.

Iron-chromium and iron-chromium-nickel constitution diagrams, hardness-temperature graphs, and strength properties of welded stainless steel. Tables, graphs, micrographs. 9 ref.
(M24, Q general, SS)

124-M. Micrographic Analysis of Ferro-Alloys and Alloy Steels by Heat Tinting. S. S. Gorelik and B. G. Livshits. *Henry Brutcher, Altadena, Calif., Translation no.* 3193, 6 p. (From *Zavodskaya Laboratoriya,* v. 16, no. 5, 1950, p. 578-580.)

Relationship between dissociation pressure of oxide and thickness of oxide film formed by atmospheric oxygen at increased temperatures. Micrographs. 6 ref. (M23, AY, Fe)

125-M. (French.) **Physicochemical Investigation of Carbide Phases Derived From Cobalt and Certain Special Cementites.** Jean Drain. *Annales de chimie (Paris),* v. 8, Nov.-Dec. 1953, p. 900-953.

Studies on preparation, properties and structure of carbides and carbide phases in cobalt; influence of cobalt on properties of cementite; and influence of sulfur on orthorhombic carbides. Tables, graphs. 40 ref. (M26, Co, Fe)

126-M. (French.) **Ultra Rapid Micrographic Examination of Copper and Its Alloys.** P. A. Jacquet. *Cuivre-Laitons-Alliages,* no. 16, Nov.-Dec. 1953, p. 43-55.

Automatic polishing apparatus which permits metallographic quality control in production shops.
(M21, Cu)

127-M. (French.) **Application of Color Micrography to Study of Aluminum, Iron, and Copper by Means of Formation of Thin Films With Interference Shades.** P. Lacombe and M. Mouflard. *Métaux, Corrosion-Industries,* v. 28, no. 340, Dec. 1953, p. 471-488 + 5 plates.

Method which gives greater sensitivity to microscopic examination. Micrographs. 60 ref.
(M21, Al, Cu, Fe)

128-M. (Book.) **Structure and Properties of Solid Surfaces.** Robert Gomer and Cyril Stanley Smith, editors. 491 p. 1953. University of Chicago Press, 5750 Ellis Ave., Chicago 37, Ill. $8.50.

Fourteen papers presented at a conference arranged by the National Research Council in September 1952. Contents may be divided into four main groups: thermodynamics and theories of surface forces; the structure of a surface and means of determining it; growth processes of and on surfaces; and processes on surfaces which leave them relatively unaltered.
(M general, N general, P general)

129-M. (Book—French.) **(Heterogeneity of Steel Ingots). Etude de l'Hétérogénéité des l'Ingots de Forge.** P. Chattier, Ch. Dubois, J. Bleton and P. Bastien. 260 p. 1953. l'Institut de Recherches de la Sidérurgie, 185, Rue President-Roosevelt, Saint-Germain-en-Laye (S. & O.), Paris, France.

A comprehensive comparison of segregation and inclusion distribution in forged 300-mm. rounds of nickel-chromium steel from four different electric furnace practices. How inclusion distribution and heterogeneity may be related to mechanical properties of quenched and tempered material.
(M29, Q general, AY)

N

Transformations and Resulting Structures

86-N. Aging Characteristics of Nickel-Chromium Alloys Hardened With Titanium and Aluminum. Rolf Nordheim and Nicholas J. Grant. *Journal of Metals,* v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Feb. 1954, p. 211-218.

Results of extensive study of aging by means of hardness, hot electrical resistance, X-ray and microscopy. Micrographs, tables, phase diagram, graphs. 10 ref.
(N7, Ti, Cr, Al, Ni)

87-N. A Study of the Effect of Carbon Content on the Structure and Properties of Sintered WC-Co Alloys. Joseph Gurland. *Journal of Metals,* v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Feb. 1954, p. 285-290.

Grain growth of tungsten carbide during sintering was measured. It was shown that the reaction takes place mainly by solution and reprecipitation of the carbide in and from the binder at sintering temperature. Tables, graphs, micrographs, phase diagrams. 13 ref.
(N3, H15, W, Co, C-n)

88-N. Orientation Relationships in Cast Germanium. W. C. Ellis and Jacqueline Fageant. *Journal of Metals,* v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Feb. 1954. p. 291-294.

All major regions in a progressively solidified germanium ingot were related through successive orders of octahedral twinning. Occurrence of lineage structure and generation and survival of orientations. Photographs. 10 ref. (N12, Ge)

89-N. Redistribution of Solutes by Formation and Solidification of a Molten Zone. W. G. Pfann. *Journal of Metals,* v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Feb. 1954, p. 294-297.

Formation and slow solidification of a molten zone in a homogeneous ingot produces a discontinuity in solute concentration at boundary of the zone and a gradient of concentration within the zone. Tests were made on germanium. Diagrams, graph, photographs. 9 ref. (N12, Ge)

90-N. On the Temperature Range of the Martensitic Transformation in the Cu-Zn System. A. L. Titchener and M. B. Bever. *Journal of Metals,* v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Feb. 1954, p. 303-304.

Results of experimental studies. Table, graphs. 6 ref. (N9, Cu, Zn)

91-N. Radioisotopes in the Study of Metal Surface Reactions in Solutions. Massoud T. Simnad. Paper from "Properties of Metallic Surfaces, Symposium". Institute of Metals, Monograph and Report Series 13. Institute of Metals, p. 23-58; disc., p. 295-364.

Exchange between metals and ions in solution. Previous experiments and explanations criticized. Several generalizations made regarding mechanism of this phenomenon. Micrographs, table, diagram. 195 ref. (N14, S19)

92-N. (German.) Special Growth Structures of Metal Crystals Solidified From the Melt. Friedrich Blaha. *Acta Physica Austriaca,* v. 8, no. 2, Dec. 1953, p. 141-166.

Crystallization tests with zinc, cadmium and tin reveal that slight changes in experimental conditions will affect crystal structure. Diagrams, photomicrographs. 44 ref. (N12, Zn, Cd, Sn)

93-N. (German.) Mechanism of Austenite-Martensite Transformation. Helmut Knapp. *Archiv für das Eisenhüttenwesen,* v. 24, nos. 11-12, Nov.-Dec. 1953, p. 497-504.

Recent literature on crystallography. Displacement of atoms can be represented by a single matrix. Diagrams. 25 ref. (N8)

94-N. (German.) Application of Time-Temperature Transformation Diagram of Continuous Cooling to Heat Treating Problems. Adolf Rose and Werner Strassburg. *Archiv für das Eisenhüttenwesen,* v. 24, nos. 11-12, Nov.-Dec. 1953, p. 505-514.

Applicability of time-temperature-transformation diagrams as a means of determining cooling process in interior of large blocks of steel and its hardenability. Graphs, table, diagram, micrographs. 33 ref. (N8, J26, ST)

95-N. (German.) The Mechanism of Graphite Crystallization in Iron. E. Feil. *Giesserei,* v. 40, no. 24, Nov. 26, 1953, p. 629-634.

Reviews published data on formation of graphite in hypo and hypereutectic iron, flaky and spheroid graphite, crystallization stages during solidification, symmetry of spheroid graphite and chemical investigation of kish. Tables, micrographs, graph. 13 ref. (N8, Fe, ST)

96-N. (German.) Recovery Phenomena in Copper-Beryllium Alloys Caused by Cold Working. W. Gruhl and U. Gruhl. *Metall,* v. 8, nos. 1-2, Jan. 1954, p. 20-23.

Experiments reveal that cold working permits repetition of age hardening. Resolution is probably due to local heating or supply of energy from cold working operation. X-rays clearly reveal recovery effect of cold working. Graphs, X-ray recordings. 10 ref. (N4, Cu, Be)

97-N. (German.) The Crystal-Growth Process of Crystals Far From the Phase Equilibrium. Ludwig Graf. *Zeitschrift für Naturforschung,* v. 8a, no. 12, Dec. 1953, p. 824-826.

Rapid crystal growth is explained by "kinetic" forms of equilibrium in which rate of crystal growth depends only on conditions at point of growth. 7 ref. (N12)

98-N. (Swedish.) Diffusion of Carbon in Different Phases of Carbon Steel. M. Hillert and R. D. Sharp. *Jernkontorets Annaler,* v. 137, no. 11, 1953, p. 785-790.

Use of activity diffusion coefficients. Shows computation of coefficients for carbon in ferrite and austenite. Experimental determination of coefficient for carbon in cementite. 10 ref. (N1, CN)

99-N. Solutions in Liquid Iron. III. Diffusion of Cobalt and Carbon. D. W. Morgan and J. A. Kitchener. *Faraday Society, Transactions,* v. 50, Jan. 1954, p. 51-60.

Technique developed for determining diffusion coefficients of solutes in liquid iron. Tables, graphs, diagrams. 20 ref. (N1, Fe, Co)

100-N. Formation of Ferrite in Hypo-Eutectoid Plain Carbon Steels. C. Margaretha Hickley and J. H. Woodhead. *Iron and Steel Institute, Journal,* v. 176, Feb. 1954, p. 129-139 + 2 plates.

Results of studies during isothermal decomposition of austenite. Graphs, micrographs, table. 24 ref. (N8, CN)

101-N. Kinetics of First-Stage Graphitization in Iron-Carbon-Silicon Alloys. J. Burke and W. S. Owen. *Iron and Steel Institute, Journal,* v. 176, Feb. 1954, p. 147-155.

Experimental studies which throw new light on processes controlling rate of reaction. Tables, graphs, diagram, micrograph. 18 ref. (N8, CI)

102-N. Theoretical Analysis of Diffusion of Solutes During the Solidification of Alloys. Carl Wagner. *Journal of Metals,* v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Feb. 1954, p. 154-160.

Theoretical calculations. Graphs, tables. 19 ref. (N12, Ni)

103-N. Some Ordering Effects in Cu_3Au at About 100° C. R. A. Dugdale and A. Green. *Philosophical Magazine,* v. 45, 7th ser., no. 361, Feb. 1954, p. 163-172.

Using electrical resistance as an indicator for ordering, it is found that Cu_3Au specimens show an ordering effect at about 100° C. Tables, graphs, diagrams. 9 ref. (N10, P15, Cu, Au)

104-N. (English.) Solubility of Carbon in Ferrite. Mats Hillert. *Acta Metallurgica,* v. 2, no. 1, Jan. 1954, p. 11-14.

Solubility of graphite in ferrite determined by a computation. Table, graph. 10 ref. (N12)

105-N. (English.) Observations on the Structural Changes Accompanying Recovery in Super-Purity Aluminium. E. C. W. Perryman. *Acta Metallurgica,* v. 2, no. 1, Jan. 1954, p. 26-37.

Structure of super-purity aluminum examined by metallographic and X-ray methods directly after cold rolling at room and liquid air temperatures. Graphs, tables, photomicrographs. 18 ref. (N4, Al)

106-N. (English.) Order-Disorder in Cu-Au Alloys. II. The Nature of the Order-Disorder Transformation and Long-Range Order. Frank E. Jaumot, Jr., and Charles H. Sutcliffe. *Acta Metallurgica,* v. 2, no. 1, Jan. 1954, p. 63-74.

Transformations studied in copper-gold alloys containing from 15.5 to 34.2 atomic % gold. Graphs, tables, diagrams. 13 ref. (N10, Cu, Au)

107-N. (English.) Coherent Growth of Martensite During Tempering. T. Ko. *Acta Metallurgica,* v. 2, no. 1, Jan. 1954, p. 75-79.

Martensite plates in a 1.5% C, 5.0% nickel steel can, during tempering, thicken or grow into bainite. Photomicrographs. 14 ref. (N8, AY)

108-N. (English.) Solid Solution Formation in the Gold-Nickel System. B. L. Averbach, P. A. Flinn and Morris Cohen. *Acta Metallurgica,* v. 2, no. 1, Jan. 1954, p. 92-100.

Sizes of ions in gold-nickel solutions, measured from diffuse X-ray scattering, are used to calculate strain energies. Reasonable agreement with observed heats of mixing is obtained. Graphs, tables. 27 ref. (N12, Au, Ni)

109-N. (English.) The Crystallography of the Beta-Alpha Transformation in Titanium. A. J. Williams, R. W. Cahn and C. S. Barrett. *Acta Metallurgica,* v. 2, no. 1, Jan. 1954, p. 117-128.

Orientation relationships, habit plane and surface contour associated with martensitic transformation in iodide titanium investigated. Diagrams, micrographs. 23 ref. (N9, Ti)

110-N. (English.) The Crystallography of Martensite Transformations. I-II. J. S. Bowles and J. K. Mackenzie. *Acta Metallurgica,* v. 2, no. 1, Jan. 1954, p. 129-147.

Experiments to obtain a consistent description of atomic displacements. 4 ref. (N8, N9)

111-N. (English.) Experiments on the Martensitic Transformation in Single Crystals of Indium-Thallium Alloys. Z. A. Basinski and J. W. Christian. *Acta Metallurgica,* v. 2, no. 1, Jan. 1954, p. 148-166.

Transformation from face-centered cubic to face-centered tetragonal phase studied in alloys containing 18.5% thallium, using cinéphotography and X-ray methods. Diagrams, micrographs. 23 ref. (N9, In, Tl)

112-N. (Dutch.) Growth and Orientation of Crystallites in Eutectic Alloys. H. Tober. *Metalen,* v. 8, no. 24, Dec. 31, 1953, p. 429-436.

Microscopic observations on lead-tin alloys of different compositions quenched at various stages of solidification. Micrographs, photographs, diagrams. 4 ref. (N12, Pb, Sn)

113-N. (French.) Application of Electronic Microdiffraction to Investigation of Phase Transformations of Al-Cu Alloys. Noboru Takahashi and Charles Fert. *Comptes rendus,* v. 237, no. 25, Dec. 21, 1953, p. 1664-1666.

Method applied to aluminum-copper film permits following of phase transformation in crystalline state. Micrographs. 4 ref. (N6, Cu, Al)

114-N. (French.) Ion Diffusion Through Electrolytic Metallic Coatings. Jean Royon. *Comptes rendus,* v. 237, no. 25, Dec. 21, 1953, p. 1694-1696.

Characteristics of diffusion phenomena. Graphs. 2 ref. (N1, L17, Cu)

115-N. (French.) **Effect of Stresses on Martensite Transformation.** Charles Crussard. *Comptes rendus,* v. 237, no. 25, Dec. 21, 1953, p. 1708-1711.

A more precise theory is developed. Results compared to calculations made by Italian mathematicians. 3 ref. (N8, ST)

116-N. (German.) **The Metallography of Light Metals. VII. Investigation of Dendritic Crystallization of Pure Aluminum.** Hans Kostron and Margarete Schippers. *Zeitschrift für Metallkunde,* v. 44, no. 11, Nov. 1953, p. 477-489.

Investigation indicates phenomena of rythmic oscillation during solidification of commercial aluminum resulting in structural patterns resembling growth rings in trees. Table, diagrams, micrographs. 22 ref. (N12, Al)

117-N. (German.) **The Metallography of the Light Metals. IX. Observations on the Structure of Continuously Cast Water-Chilled Ingots of 99.5 Al.** Hans Kostron and Margarete Schippers. *Zeitschrift für Metallkunde,* v. 44, no. 11, Nov. 1953, p. 489-494.

Metallographic study to determine freezing rate in various zones. Diagrams, micrographs, photographs. 7 ref. (N12, Al)

118-N. (German.) **Contribution to the Crystallization of Al-Si Alloys.** Gustav Gürtler. *Zeitschrift für Metallkunde,* v. 44, no. 11, Nov. 1953, p. 503-509.

Granular and laminar form of silicon crystals. Change of anomalous aluminum-silicon eutectic into a normal eutectic shown to be the result of supercooling of phosphorus-free alloys. Table, graphs, micrographs. 30 ref. (N12, Al, Si)

119-N. (Russian.) **Effect of Silicon on the Speed of Carbon Diffusion in Austenite.** M. A. Krishtal. *Doklady Akademii Nauk SSSR,* v. 92, no. 5, Oct. 11, 1953, p. 951-953.

Dependence of thickness of the austenite layer on time at various temperatures. Formula given and discussed. Graph, diagram. 6 ref. (N1, N8, Si, AY)

120-N. (Russian.) **State of Martensite Crystals of Hardened Low-Carbon Steels.** G. V. Kurdiumov, M. D. Perkas and A. E. Shamov. *Doklady Akademii Nauk SSSR,* v. 92, no. 5, Oct. 11, 1953, p. 955-957.

Shows that when carbon steel with 0.1% carbon is abruptly quenched the martensite has no time to decompose and carbon is maintained in solid solution. Graphs. 10 ref. (N8, CN)

121-N. Ageing Curves at 110° C. on Binary and Ternary Aluminium—Copper Alloys. H. K. Hardy. *Institute of Metals, Journal,* v. 82, Feb. 1954, p. 236-238.

Ternary alloys with indium or tin reached peak hardness at shorter aging times. Graphs. 3 ref. (N7, Al, Cu)

122-N. Structural Ageing Characteristics of Binary Aluminium—Copper Alloys. J. M. Silcock, T. J. Heal and H. K. Hardy. *Institute of Metals, Journal,* v. 82, Feb. 1954, p. 239-248 + 2 plates.

X-ray studies on single crystals. Data agree with aging curves. Tables, diagram, graphs. 21 ref. (N7, Al, Cu)

123-N. Heterogeneity of Austenite. I. A. Oding and M. G. Lozinskii. *Henry Brutcher, Altadena, Calif., Translation no.* 3126, 8 p. (From *Doklady Akademii Nauk SSSR,* v. 89, no. 2, 1953, p. 275-278.)

Previously abstracted from original. See item 273-N, 1953. (N8, ST)

124-N. Reactions of Molten Zinc-Aluminum Alloys With Solid Iron. E. Gebhardt and I. Schmidt. *Henry Brutcher, Altadena, Calif., Translation no.* 3128, 15 p. (From *Zeitschrift für Metallkunde,* v. 39, no. 11, 1947, p. 321-325.)

Weight losses of iron specimens in molten Zn-Al and Zn-Al-Cu were plotted against reaction time and bath composition. Graphs, micrographs. 12 ref. (N12, Zn, Al, Fe)

125-N. Effect of Magnesium Upon Surface Tension, Supercooling, and Crystallization of Austenitic Steel. N. S. Kreshchanovskii and R. P. Zaletaeva. *Henry Brutcher, Altadena, Calif., Translation no.* 3130, 7 p. (From *Liteinoe Proizvodstvo,* v. 4, no. 3, 1953, p. 20-21.)

Experimental study of influence of magnesium additions ranging from 0 to 0.50%. Graphs, micrographs. 4 ref. (N12, P10, AY)

126-N. Formation and Properties of Delta Iron (Ferrite) and Sigma Phase in Austenitic Chromium-Nickel Steels. I. H. Buchholtz, H. Krächter and F. Kraemer. *Henry Brutcher, Altadena, Calif., Translation no.* 3150, 22 p. (From *Archiv für das Eisenhüttenwesen,* v. 24, nos. 3-4, 1953, p. 113-125.)

Previously abstracted from original. See item 196-N, 1953. (N8, P general, Q general, SS)

127-N. On the Kinetics of Development of the Graphite Structure in Cast Iron. K. P. Bunin and I. V. Salli. *Henry Brutcher, Altadena, Calif., Translation no.* 3169, 5 p. (From *Doklady Akademii Nauk SSSR,* v. 83, no. 6, 1952, p. 841-842.)

Previously abstracted from original. See item 222-N, 1952. (N8, CI)

128-N. (English.) **Anelastic Study on the Diffusion Coefficients of Alpha-Brass.** Nobuhiko Kunitomi. *Science Reports of the Research Institutes, Tohoku University,* Series A, v. 5, no. 4, Aug. 1953, p. 335-342.

Anelastic relaxation in alpha brass was measured in temperature range from about 20 to 400° C. Chemical diffusion coefficient was calculated from these results. Diagram, graphs. 19 ref. (N1, Q22, Cu)

129-N. (English.) **Growth Rates of New Grains During the Primary Recrystallization of Aluminium Plates.** Hideji Suzuki. *Science Reports of the Research Institutes, Tohoku University,* Series A, v. 5, no. 5, Oct. 1953, p. 413-432.

Effects of impurity, temperature, deformation and grain size were determined on cold worked specimens of high-purity aluminum and aluminum alloys containing up to 2.0% of copper. Tables, graphs. 15 ref. (N3, N5, Al)

130-N. (French.) **Influence of Hydrogen or Nitrogen Insertion on Allotropic Transformation Temperature of Cobalt.** André Michel, Jean Drain and Raymond Bridelle. *Comptes rendus,* v. 238, no. 1, Jan. 4, 1954, p. 107-108.

Extreme purity of metal shown to be indispensible for such studies. Partial irreversibility found for the alpha-beta transformation. 9 ref. (N6, Co)

P

Physical Properties and Test Methods

116-P. Basic Diagrams of Composition vs. High-Temperature Strength. *Metal Progress,* v. 65, Feb. 1954, p. 184-185. (Digest of "Basic Types of Diagrams of Composition Versus High-Temperature Strength in Metallic Systems", I. I. Kornilov, *Doklady Akademii Nauk SSSR,* v. 86, 1952, p. 721-724.

Previously abstracted from original. See item 436-P, 1953. (P11, SG-h)

117-P. Nuclear Magnetic Resonance in Metals. II. Temperature Dependence of the Resonance Shifts. B. R. McGarvey and H. S. Gutowsky. *Journal of Chemical Physics,* v. 21, Dec. 1953, p. 2114-2119.

Temperature dependence of nuclear resonance shift in metals investigated in lithium, sodium, rubidium, cesium and gallium. Graphs. 20 ref. (P16, Li, Na, Rb, Cs, Ga)

118-P. Thermal Neutron Resonance of Sm. A. W. McReynolds and E. Andersen. *Physical Review,* v. 93, ser. 2, Jan. 1, 1954, p. 195-196.

Total neutron cross section was measured. Agreement with Breit-Wigner one-level resonance formula was good. Graphs, table. 5 ref. (P10, Sm)

119-P. The d^3 and d^4 Configurations of Vanadium. Sydney Meshkov. *Physical Review,* v. 93, ser. 2, Jan. 15, 1954, p. 270-272.

Term values of d^3 configuration of vanadium III calculated using experimentally observed energies of d^4 configuration of vanadium II. An iterative type calculation is then made for term values of d^4 in terms of both experimental energies of d^3 and calculated values of the still unidentified terms of d^3. Each of these calculations leads to an appreciable improvement of the agreement between calculated and observed energies. Tables. 6 ref. (P12, M26, V)

120-P. Cross Sections for Formation of Na^{22} From Aluminum and Magnesium Bombarded With Protons. R. E. Batzel and G. H. Coleman. *Physical Review,* v. 93, ser. 2, Jan. 15, 1954, p. 280-282.

Cross sections for formation of sodium-22 from proton bombardment of aluminum and magnesium have been determined for energy range from thresholds to 32 m.e.v. Graphs, table. 8 ref. (P10, Na, Al, Mg)

121-P. A Calculation of the Eigenvalue of Electronic States in Metallic Lithium by the Cellular Method. B. Schiff. *Physical Society, Proceedings,* v. 67, no. 409A, Jan. 1954, p. 2-8.

Potential function computed for lithium ion core; cohesive energy of metallic lithium is found; and eigen values for conduction electrons in metallic lithium are calculated. Tables, graphs. 17 ref. (P15, Li)

122-P. Momentum Distribution of Electrons in Solids: Results for Some Metals Using the Thomas-Fermi Method. N. H. March. *Physical Society, Proceedings,* v. 67, no. 409A, Jan. 1954, p. 9-16.

Experimental results show that momentum distribution of the electrons in metallic lithium and beryllium differs from that given by wave-mechanical calculations. Graphs. 12 ref. (P15, Li, Be, Na, K, Rb)

123-P. The Magnetic Susceptibility of Metallic Uranium. L. F. Bates and D. Hughes. *Physical Society, Proceedings,* v. 67, no. 409B, Jan. 1954, p. 28-37.

Sudden changes in susceptibility accompany the alpha-beta and beta-gamma phase changes at 600 and 767° C. respectively. Diagram, graphs, tables. 12 ref. (P16, U)

124-P. Intrinsic Magnetization in Platinum Cobalt Alloys. A. W. Simpson and R. H. Tredgold. *Physical*

Society, Proceedings, v. 67, no. 409B, Jan. 1954, p. 38-41.

Effect of heat treatment on alloys containing small percentages of cobalt. Graphs. 6 ref. (P16, Pt, Co)

125-P. The Effect of Method of Preparation on the High-Frequency Surface Resistance of Metals. R. G. Chambers and A. B. Pippard. Paper from "Properties of Metallic Surfaces, Symposium". Institute of Metals, Monograph and Report Series 13. Institute of Metals, p. 281-294; disc., p. 295-364.

High-frequency behavior of metal, particularly surface resistance, determined by properties of thin surface layer of the order of micron in thickness. Graphs, table. 15 ref. (P15)

126-P. (English.) The Anomalous Skin Effect and the Reflectivity of Metals. IV. Theoretical Optical Properties of Thin Metallic Films. R. B. Dingle. *Physica,* v. 19, no. 12, Dec. 1953, p. 1187-1199.

Reflection, transmission and absorption coefficients of a thin metallic film may be determined theoretically when due account is taken of the anomalous nature of the skin effect. Table, 9 ref. (P17)

127-P. (German.) Anisotropic Changes in Size Due to Heat Treatment of Ledeburite Chromium Toolsteels. Josef Frehser. *Archiv für das Eisenhüttenwesen,* v. 24, nos. 11-12, Nov.-Dec. 1953, p. 483-494; disc., p. 494-495.

Experimental results show that causes of anisotropic size change from hardening and tempering can be expressed in general principles. Tables, graphs, diagrams, micrographs. 38 ref. (P10, J26, J29, TS)

128-P. (German.) Permanent Magnets of Barium Oxide and Trivalent Iron Oxide. Hermann Fahlenbrach and Walter Heister. *Archiv für das Eisenhüttenwesen,* v. 24, nos. 11-12, Nov.-Dec. 1953, p. 523-527; disc., p. 527-528.

Reviews literature on magnetic properties, advantages and disadvantages. Application. Graphs, photographs. 23 ref. (P16, Ba, Fe)

129-P. (German.) Investigation of the Mechanism of Electric Conductivity of Gray Tin. G. Busch and J. Wieland. *Helvetica Physica Acta,* v. 26, nos. 7-8, Sept.-Oct. 1953, p. 697-730.

Results interpreted by existing theory. Absolute value determined. Tables, graphs. 18 ref. (P15, Sn)

130-P. (German.) Problem of Activation of Metal Surfaces. Cyrill Schaub and Werner Liedtke. *Zeitschrift für Metallkunde,* v. 44, no. 12, Dec. 1953, p. 570-572.

Blackening of photographic plate in an electric field is due partly to electron emission and partly to H_2O_2 formed by chemosorption during cold working of metals. Photographs. 7 ref. (P13, P15, G general)

131-P. (German.) The Properties of Metal Melts. VIII. The Density of Molten Aluminum and Several Aluminum Alloys. Erich Gebhardt, Manfred Becker and Stefan Dorner. *Zeitschrift für Metallkunde,* v. 44, no. 12, Dec. 1953, p. 573-575.

Results of density determinations on pure aluminum and aluminum-copper, aluminum-iron and aluminum-titanium alloys performed by the buoyancy process in salt melt of known density. Graphs, tables. (P10, Al)

132-P. Lattice Defects and the Electrical Resistivity of Metals. T. Broom. *Advances in Physics,* v. 3, Jan. 1954, p. 26-83.

Theory and extensive experiments. Tables, graphs, diagram. 146 ref. (P15, M26)

133-P. The Formation of Powder and Its Dependence on Crystal Face During the Catalytic Reaction of Hydrogen and Oxygen on a Single Crystal of Copper. J. Bruce Wagner, Jr., and Allan T. Gwathmey. *American Chemical Society, Journal,* v. 76, Jan. 20, 1954, p. 390-391 + 2 plates.

Results of experimental studies. Photographs, micrographs. 7 ref. (P13, M26, Cu)

134-P. The Thermal and Electrical Conductivity of Copper at Low Temperatures. G. K. White. *Australian Journal of Physics,* v. 6, Dec. 1953, p. 397-404.

Measurements of thermal conductivity from 2 to 160° K. and electrical conductivity from 1.4 to 293° K. of copper in strained and annealed states. Diagram, graphs. 16 ref. (P11, P15, Cu)

135-P. The Effect of Tension on the Thermoelectric Properties of Metals. A. J. Mortlock. *Australian Journal of Physics,* v. 6, Dec. 1953, p. 410-419.

Measurements made on 11 different metals of the change in thermo-electric power accompanying elastic tensile strain. Tables, graphs, diagram. 16 ref. (P15, Q21)

136-P. The Index of Refraction of Germanium Measured by an Interference Method. D. H. Rank, H. E. Bennett and D. C. Cronemeyer. *Optical Society of America, Journal,* v. 44, Jan. 1954, p. 13-16.

High-precision determination of index of refraction in 2.0-2.4 μ region is presented. Tables, diagrams. 6 ref. (P17, Ge)

137-P. Infrared Index of Refraction of Tellurium Crystals. Patricia A. Hartig and Joseph J. Loferski. *Optical Society of America, Journal,* v. 44, Jan. 1954, p. 17-18.

Results for single-crystal samples having 10^{17} impurity atoms per cc. Table. 5 ref. (P17, Te)

138-P. On the Validity of Mott's Theory of the Beta-Flow in Polycrystals. Paul Feltham. *Philosophical Magazine,* v. 45, 7th ser., no. 360, Jan. 1954, p. 9-12.

Surveys experimental evidence on activation energy for transient creep. Table. 12 ref. (P13)

139-P. The Thermal and Electrical Conductivity of Magnesium at Low Temperatures. H. M. Rosenberg. *Philosophical Magazine,* v. 45, 7th ser., no. 360, Jan. 1954, p. 73-79.

Electrical and thermal resistivities of the same specimen have been measured together between 2 and 35° K. Graphs. 12 ref. (P11, P15, Mg)

140-P. An Attempt to Find Anisotropy in the Superconductive Properties of Gallium. A. J. Croft, J. L. Olsen-Baer and R. W. Powell. *Philosophical Magazine,* v. 45, 7th ser., no. 361, Feb. 1954, p. 123-125.

Experiments in temperature range 0.2 to 1° K. show that dependence of superconductive transition point on crystallographic direction is less than 0.002° K. 6 ref. (P15, Ga)

141-P. Electronic Conduction in Grey Tin. J. T. Kendall. *Philosophical Magazine,* v. 45, 7th ser., no. 361, Feb. 1954, p. 141-157.

Conductivity and Hall constant of gray-tin alloys containing antimony and gallium were measured over a temperature range of 77 to 286° K. Tables. graphs, diagram. 9 ref. (P15, Ga, Sn)

142-P. Antiferromagnetism of Manganese. Lyle Patrick. *Physical Review,* v. 93, ser. 2, Feb. 1, 1954, p. 370.

Measurements of resistance and thermo-electric power of manganese show anomalies near Neél temperature. Evidence of a manganese transition at 100° K. Graph. 3 ref. (P16, P15, Mn)

143-P. The Change of Ferromagnetic Curie Points With Hydrostatic Pressure. Lyle Patrick. *Physical Review,* v. 93, ser. 2, Feb. 1, 1954, p. 384-392.

Measurements on effect of pressure on Curie temperature for 13 ferromagnetic materials. Table, graphs, diagrams. 23 ref. (P16, Si, Fe, Co, Ni, Gd)

144-P. The Influence of Pressure on the Curie Temperature of Iron and Nickel. R. Smoluchowski. *Physical Review,* v. 93, ser. 2, Feb. 1, 1954, p. 392-393.

Comparison between Patrick's measurements of change of Curie temperature under pressure and theory based on a Brillouin function. 5 ref. (P16, Ni, Fe)

145-P. A New Method for Measuring Auger Transitions. Charles E. Roos. *Physical Review,* v. 93, ser. 2, Feb. 1, 1954, p. 401-405.

Fluorescence yields of zirconium, niobium, molybdenum, rhodium, palladium, silver, cadmium and tin measured by a new X-ray method involving use of a scintillation counter. Graphs, diagrams, tables. 26 ref. (P17, Zr, Nb, Mo, Rh, Pd, Ag, Cd, Sn)

146-P. Thermo-Electricity at Low Temperatures. II. The Alkali Metal Group. D. K. C. MacDonald and W. B. Pearson. *Royal Society, Proceedings,* v. 221, ser. A, Feb. 9, 1954, p. 534-540.

Measures in detail the thermo-electric behavior of all alkali metals, together with some alloys, in low-temperature region below 80° K. Graphs. 8 ref. (P15, Li, Na, K, Rb, Cs)

147-P. Effect of Heat-Treatment on the Magnetic Properties of Cold Worked 18-8. Samuel Storchheim. *Wire and Wire Products,* v. 29, Feb. 1954, p. 147-148, 149-150.

Results of experimental studies. Tables, graphs. (P16, SS)

148-P. A New Semi-Automatic Apparatus for Measurement of Specific Heats and the Specific Heat of Sodium Between 55 and 315° K. T. M. Dauphinee, D. K. C. MacDonald and H. Preston-Thomas. *Royal Society, Proceedings,* v. 221, ser. A, Jan. 21, 1954, p. 267-276.

Apparatus and results for sodium. Graphs, diagrams. 9 ref. (P12, Na)

149-P. (English.) Activity of Iron in Iron-Platinum Solid Solutions. Hugo R. Larson and John Chipman. *Acta Metallurgica,* v. 2, no. 1, Jan. 1954, p. 1-2.

Data on contamination of platinum by iron from melts consisting of calcium oxide and iron oxides under controlled conditions of known activity of iron and oxygen. Diagram, graph, table. 4 ref. (P12, Fe, Pt)

150-P. (English.) Effect of Neutron Irradiation on a Supersaturated Solid Solution of Beryllium in Copper. G. T. Murray and W. E. Taylor. *Acta Metallurgica,* v. 2, no. 1, Jan. 1954, p. 52-62.

Effects on electrical resistivity, hardness, X-ray line shape and position and density of a solution annealed copper-beryllium alloy. Graphs, tables. 14 ref. (P10, P15, Q29, Be, Cu)

151-P. (English.) The Change in Resistivity, on Plastic Deformation, of Silver-Copper and Silver-Gold Alloys. W. H. Aarts and R. K. Jarvis. *Acta Metallurgica,* v. 2, no. 1, Jan. 1954, p. 87-91.

Wires of silver, gold, copper, silver-copper and silver-gold alloys were stretched at room temperature, −80° C. and at liquid air point. Change of resistivity was de-

termined as well as recovery of resistivity on warming from low temperatures to room temperature. Graphs, tables. 7 ref. (P15, Q24, Cu, Au, Ag)

152-P. (English.) **The Anomalous Skin Effect and the Reflectivity of Metals. IV. Theoretical Optical Properties of Thin Metallic Films.** R. B. Dingle. *Physica*, v. 19, no. 12, Dec. 1953, p. 1187-1199.

Mathematical analysis. Table. 5 ref. (P17)

153-P. (French.) **New Invariance of the Gage of Electromagnetism and Superconductivity.** Bernard Jouvet. *Comptes rendus*, v. 238, no. 4, Jan. 25, 1954, p. 454-456.

New definition of electromagnetic potential and new invariance of electro-neutrino magnetism facilitates proof of London's equations and understanding of superconductivity mechanism. 4 ref. (P16)

154-P. (German.) **A New Effect in the Electrolytic Transfer in Solid Alloys.** W. Seith and H. Wever. *Zeitschrift für Elektrochemie*, v. 57, no. 10, 1953, p. 891-900.

Solid electrolysis experiments with copper-aluminum alloys between two copper electrodes reveal that displaced atoms of the alloys move toward the cathode independently. Tables, graphs, diagrams, micrographs. 12 ref. (P15, Al, Cu)

155-P. (German.) **On the Age-Hardening of Aluminum-Silver Alloys. VIII. Measurement of the Hall Constants and Magnetic Susceptibility.** Werner Köster and Adolf Frei. *Zeitschrift für Metallkunde*, v. 44, no. 11, Nov. 1953, p. 495-502.

Effect of heat-treating on Hall constants and magnetic susceptibility of an aluminum-silver alloy with 3.9% copper and 0.5% silicon investigated as means of studying the age hardening process. Experiments described and results evaluated. Graphs, tables. 10 ref. (P15, P16, N7, Al, Ag)

156-P. (Russian.) **Theory of Electroconductivity of Metals at Low Temperatures.** A. I. Rezanov. *Doklady Akademii Nauk SSSR*, 92, no. 5, Oct. 11, 1953, p. 935-937.

Compares additional electroresistance caused in ferromagnetic metals by mechanism of transfer of energy of external 4-s to internal 3-d electrons with the ordinary "phonon" effect. Derives kinetics equation for electroconductivity of these metals. 4 ref. (P15)

157-P. (Russian.) **Influence of Nitrogen on Surface Tension and Crystallization of Austenitic Steel.** N. S. Kreshchanovskii, V. I. Prosvirin and R. P. Zaletaeva. *Liteinoe Proizvodstvo*, 1954, no. 1, Jan.-Feb., p. 23-24.

Concludes that presence of nitrogen shows no appreciable influence on primary crystallization. Table, graph, micrographs. 6 ref. (P10, N12, AY)

158-P. Electrical Measurements at High Temperatures as an Efficient Tool for Thermal Analysis. F. W. Glaser and D. Moskowitz. *Powder Metallurgy Bulletin*, v. 6, Dec. 1953, p. 178-185.

Apparatus for measurement of electrical resistivities of bar samples at elevated temperatures. Graphs, diagram, photograph. 10 ref. (P15)

159-P. Contribution to the Theory of Surface Tension of Metals. S. M. Zadumkin. *Henry Brutcher, Altadena, Calif., Translation no.* 3172, 6 p. (From *Zhurnal Fizicheskoi Khimii*, v. 27, no. 4, 1953, p. 502-504.)

Previously abstracted from original. See item 65-P, 1954. (P10, P12)

160-P. (English.) **On Activities of Coexisting Elements in Molten Iron. II. The Activity of Silicon in Molten Fe-Si System.** Koji Sanbongi and Masayasu Ohtani. *Science Reports of the Research Institutes, Tohoku University*, Series A, v. 5, no. 4, Aug. 1953, p. 350-357.

Electromotive force corresponding to change of silicon content in iron was measured in an electrode concentration cell. Diagram, graphs, tables. 11 ref. (P12, Fe, Si)

161-P. (English.) **Ferromagnetic Domain Patterns on Nickel Crystals. I. Domain Patterns on the Magnetically Important Surfaces of Unmagnetized Nickel Crystals.** Mikio Yamamoto and Takao Iwata. *Science Reports of the Research Institutes, Tohoku University*, Series A, v. 5, no. 5, Oct. 1953, p. 433-459.

The (110) surface of nickel crystals showed plate, tree and parallelogram-net patterns. Pattern observed on (211) surface was simple while those on (100) and (111) surfaces were much more complicated. Dot and deformed maze patterns were observed on disturbed surfaces. Micrographs, diagrams. 30 ref. (P16, Ni)

162-P. (German.) **The Quantum Theory on a New Cause of Ferromagnetism.** G. Heber. *Annalen der Physik*, v. 13, nos. 1-5, Oct. 1953, p. 44-72.

Theoretical discussion. Interaction of 3d and 4s electrons of a crystal as a cause of ferromagnetism. Approximate determination of statistical averages for spontaneous magnetization and energy of crystals at low temperatures. Graphs, table. 17 ref. (P16, Fe, Ni, Co)

163-P. (German.) **Electrical Conductivity of the Solid Solutions of Intermetallic Compounds.** G. Busch and U. Winkler. *Helvetica Physica Acta*, v. 26, no. 6, 1953, p. 578-583.

Solid solutions of magnesium-germanium-tin system investigated for their lattice constants and electrical conductivities. 9 ref. (P15, Mg, Ge, Sn)

164-P. (German.) **The Magnetic Properties of Semiconducters With Special Consideration of Gray Tin.** G. Busch and E. Mooser. *Helvetica Physica Acta*, v. 26, no. 6, 1953, p. 611-656.

Measurement of magnetic susceptibility of tin and of tin contaminated with foreign atoms of different kind from room temperature to −200° C. Diagrams, tables, graphs. 24 ref. (P16, Sn)

165-P. (German.) **Magnetic Investigations on the Nature of the Cumuli in the Precipitate from the Cu-Fe System.** A. Knappwost and G. E. Bockstiegel. *Zeitschrift für Elektrochemie*, v. 57, no. 8, 1953, p. 700-709.

Magnetic measurements on copper-iron solid solutions quenched from 1030° C. and tempered at above 600° C. show the meta-stability of supersaturated solution is apparent. Graphs, diagrams, table. 27 ref. (P16, N12, Cu, Fe)

166-P. (German.) **Research on the Relationship of Hydrogen Overvoltage and Catalytic Effectiveness of Metal Surfaces.** E. Cremer and R. Kerber. *Zeitschrift für Elektrochemie*, v. 57, no. 8, 1953, p. 757-762.

Catalytic effectiveness of nickel, copper, cobalt and copper-zinc and nickel-iron-molybdenum alloys and rate of electrolytic hydrogen dissociation at same overvoltage. Diagrams, graphs, tables. 22 ref. (P15, Ni, Co, Cu, Zn, Fe, Mo)

167-P. (German.) **The Boundary-Layer Theory of Chemisorption. A Contribution to the Explanation of Processes at the Solid-Gas Surface of Contact.** H. J. Engell and K. Hauffe. *Zeitschrift für Elektrochemie*, v. 57, no. 8, 1953, p. 762-773.

Effect of chemisorption on electrical conductivity and electron-work function of metals and semiconductors. Graphs, diagrams, 23 ref. (P13, P15)

168-P. (German.) **High-Frequency Conductivity of Hexagonal Selenium.** H. Rebstock and K. Seiler. *Zeitschrift für Naturforschung*, v. 9a, no. 1, Jan. 1954, p. 49-55.

Measurements of conductivity of test pieces tempered at 217° C. for various times and with various iodine content. Diagrams, graphs. 21 ref. (P15, Se)

Q

Mechanical Properties and Test Methods; Deformation

245-Q. Heat Treatment, Structure, and Mechanical Properties of Ti-Mn Alloys. F. C. Holden, H. R. Ogden and R. I. Jaffee. *Journal of Metals*, v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, Feb. 1954, p. 169-184.

Study of factors affecting mechanical properties of beta-stabilized titanium alloys. Principal compositional factors have been found to be solid-solution strengthening, martensitic transformation and instability of beta phase. Structural factors, such as grain size and shape, were found to have more influence on ductility and toughness than on strength. Graphs, micrographs, tables, photographs. 4 ref. (Q general, J27, M27, Ti, Mn)

246-Q. The Structure of Surfaces and the Mechanism of Friction. J. W. Menter. *Birmingham Metallurgical Society, Journal*, v. 33, Sept. 1953, p. 97-118.

Experimental work which contributed to theories presented. Micrographs, graphs, tables, diagrams. (Q9, M28)

247-Q. Scatter of Results of Creep-Rupture Tests on Heat-Resisting Steels. H. Zschokke. *Brown Boveri Review*, v. 40, nos. 5-6, May-June 1953, p. 199-209.

Reports that measured rupture strengths are liable to varying degrees of scatter. Photograph, graphs, tables. (Q4, SS)

248-Q. Martensite Formations on Wire Rope. C. M. Zerr. *Drilling*, v. 15, Feb. 1954, p. 61-63, 118.

Scattered spasmodic breaks that appear on wire rope operating over standard, properly designed and maintained sheaves. (Q26, N8, ST)

249-Q. Plated Locknuts Reduce Galling in Titanium Bolts. R. A. Baughman. *Iron Age*, v. 173, Feb. 11, 1954, p. 134-135.

Tests to determine relaxation and galling characteristics of titanium bolts show that best bolt service is obtained by using silver-plated locknuts in combination with rolled threads on bolts. Tables. (Q9, K13, Ti)

250-Q. Observations on Elevated-Temperature Tensile Deformation. R. W. Guard, J. H. Keeler and S. F. Reiter. *Journal of Metals*, v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, Feb. 1954, p. 226-227.

Results of experimental studies on effects of prior cold work and strain rate on zirconium and alloy steel. Graphs. 3 ref. (Q23, Zr, AY)

251-Q. High Temperature Strength of Wrought Aluminum Powder Products. Eric Gregory and Nicholas J. Grant. *Journal of Metals*, v. 6, Feb.

1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Feb. 1954, p. 247-252.

Creep rupture properties of wrought aluminum powder products made from five grades of sintered aluminum powder were investigated at temperatures from 400 to 900° F. for rupture times up to 1000 hr. Table, diagram, graphs, micrographs. 16 ref. (Q4, H11, Al)

252-Q. Effect of Stress on the Creep Rates of Polycrystalline Aluminum Alloys Under Constant Structure. O. D. Sherby, R. Frenkel, J. Nadeau and John E. Dorn. *Journal of Metals,* v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Feb. 1954, p. 275-279.

Method for study of creep rate dependence of metals on applied stress under condition of constant structure. Method applied to pure aluminum and to dilute solid solution alloys of magnesium, copper, germanium, zinc and silver in aluminum. Graphs, table. 17 ref. (Q3, Al)

253-Q. Plasticity of Molybdenum Single Crystals at High Temperatures. R. Maddin and N. K. Chen. *Journal of Metals,* v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Feb. 1954, p. 280-284.

Single crystals of molybdenum were extended at temperatures from 1300 to 2500° C. With increasing temperatures, yield becomes more pronounced and number of slip bands for equal amounts of elongation decreases. Slip, at high temperatures, fragments the structure. Graphs, diagram, micrographs, tables. 10 ref. (Q23, Mo)

254-Q. Hydrogen Embrittlement of Steels. Jack T. Brown and William M. Baldwin, Jr. *Journal of Metals,* v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Feb. 1954, p. 298-303.

Purpose of investigation was fuller characterization of effects of varying temperature and strain rate on fracture strain of hydrogen-charged steel. Graphs, diagrams. 12 ref. (Q23, ST)

255-Q. On the Torsional Deformation and Recovery of Single Crystals. S. S. Hsu and B. D. Cullity. *Journal of Metals,* v. 6, Feb. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Feb. 1954, p. 305-312.

Stress distribution at surface of a twisted cylinder analyzed along boundary of a slip plane of arbitrary orientation. Analysis applied to torsion of cylindrical crystals of magnesium and aluminum. Photographs, tables, diagrams, graphs. 10 ref. (Q24, Mg, Al)

256-Q. A New Theory of Metal Transfer and Wear. I-Ming Feng. *Lubrication Engineering,* v. 10, Feb. 1954, p. 34-38.

Mechanical interlocking effect of plastic roughening of the interface of contacting high spots as primary cause and adhesion or diffusion process induced by temperature flash during breakage of high spots as secondary cause of metal transfer and wear. Diagrams. 12 ref. (Q9)

257-Q. Dislocations or What Makes Metals so Weak? W. T. Read, Jr. *Metal Progress,* v. 65, Feb. 1954, p. 101-106, 168, 170, 172.

Crystal structure and defects or imperfections which permit plastic deformations. Diagrams, photograph. (Q24, M26)

258-Q. Frictional Properties of Titanium and Its Alloys. E. Rabinowicz. *Metal Progress,* v. 65, Feb. 1954, p. 107-110.

Severe galling and metal transfer were noted in sliding applications and high rates of wear in related operations of cutting, drawing and grinding. Diagram, photomicrographs, tables, graph. (Q9, Ti)

259-Q. Properties of Aluminum Bearings. *Metal Progress,* v. 65, Feb. 1954, p. 185-186. (Digest of "Properties and Production of Aluminum Bearings", by Arthur B. Shaw, *Engineering Journal* (General Motors Corp.), v. 1, June-July 1953, p. 49.)

Development of long-lived bearings for automotive use. (Q general, T7, Al)

260-Q. Correlation Energy in Metals and the Cohesive Energy of Metallic Sodium. S. Raimes. *Physical Society, Proceedings,* v. 67, no. 409A, Jan. 1954, p. 52-56.

Method of Wigner and Seitz for calculating cohesive energy of metallic sodium compared with a recent method of Löwdin. Graphs. 10 ref. (Q23, Na)

261-Q. A Study of Residual Stresses in Flat Beams by Electropolishing Methods. D. J. Demorest and D. O. Leeser. *Society for Experimental Stress Analysis, Proceedings,* v. 11, 1953, p. 45-54.

Investigation involved removal of successive thin, uniform layers of surface material with minimum effect to residual stresses under consideration. Diagrams, tables. 9 ref. (Q25)

262-Q. Device for Applying Uniform Loading to Boundaries of Complicated Shape. A. J. Durelli, R. L. Lake and C. H. Tsao. *Society for Experimental Stress Analysis, Proceedings,* v. 11, 1953, p. 55-61.

New method, consisting of rubber tube in grooved fixture, which conforms to shape of the boundary. Pressure is applied by inflating the tube with compressed gas. Photographs, diagrams, graph, table. 5 ref. (Q25)

263-Q. Effects of Plastic Flow and Work-Hardening in the Experimental Stress Analysis of Magnesium-Alloy Parts. E. H. Schuette. *Society for Experimental Stress Analysis, Proceedings,* v. 11, 1953, p. 81-96.

Results of tests on sand-cast magnesium alloy, giving quantitative illustrations of phenomena involved. Their significance in stress analysis techniques. Graphs, tables. 7 ref. (Q25, Mg)

264-Q. Photoelasticity—A Precision Instrument of Stress Analysis. M. M. Forcht, R. Guernsey, Jr., and D. Landsberg. *Society for Experimental Stress Analysis, Proceedings,* v. 11, 1953, p. 105-112; disc., p. 113-114.

Salient characteristics of technique. New improvements. Graphs, table, stress patterns. 11 ref. (Q25)

265-Q. Initial Fringes in Photoelastic Models and Their Effects. Robert M. Gray. *Society for Experimental Stress Analysis, Proceedings,* v. 11, 1953, p. 115-118.

Includes calculations which will permit separation of initial from final pattern, as well as a correction for direction of stress. Graph, tables. (Q25)

266-Q. Self-Temperature-Compensating SR-4 Strain Gages. R. S. Barker. *Society for Experimental Stress Analysis, Proceedings,* v. 11, 1953, p. 119-128.

Gages, test procedure and test results. Graphs. 3 ref. (Q25)

267-Q. Welded Portal Frames Tested to Collapse. J. M. Ruzek, C. F. Braun, K. E. Kundsen, E. R. Johnston and L. S. Beedle. *Society for Experimental Stress Analysis, Proceedings,* v. 11, 1953, p. 159-180.

Testing apparatus, measurement techniques and testing procedure for investigation of ultimate carrying capacity of welded portal frames. Method of providing lateral support to frames and a simple device for measuring change in curvature of structural members. Photographs, diagrams, graphs, table. 13 ref. (Q25)

268-Q. Use of Brittle Coating Data in Stress Analysis. A. J. Durelli and C. H. Tsao. *Society for Experimental Stress Analysis, Proceedings,* v. 11, 1953, p. 181-196.

Law of failure of brittle coating, state of stress in coating, determination of ultimate strength of coating, analysis of brittle coating data, failure chart of coating and effect of refrigeration. Photographs, diagrams, graphs. (Q25)

269-Q. A New Electric Resistance Strain Gauge for Large Strain. N. L. Svensson. *Society for Experimental Stress Analysis, Proceedings,* v. 11, 1953, p. 197-202.

Development of new type of unbonded electric resistance strain gage which can be designed to measure strains up to 8 or 10%, and yet be in a position to measure elastic strains resulting from unloading the specimen. Diagrams, graphs. (Q25)

270-Q. Two Machines for Combined Bending and Torsion Fatigue. W. N. Findley and W. I. Mitchell. *Society for Experimental Stress Analysis, Proceedings,* v. 11, 1953, p. 203-212.

Design and features of apparatus to convert Krouse plate-bending fatigue machines and Sonntag vibratory fatigue machines for use in tests under combined bending and torsion. Graphs, photographs. 4 ref. (Q7)

271-Q. Machine for Static and Dynamic Testing of Slabs. W. M. Wells, Jr., and R. J. Hansen. *Society for Experimental Stress Analysis, Proceedings,* v. 11, 1953, p. 213-220.

Design and construction of testing machine. Diagrams, graphs, photograph. (Q25)

272-Q. Recording Interferometer for Strain Gage Calibration. A. S. Kobayashi and E. E. Day. *Society for Experimental Stress Analysis, Proceedings,* v. 11, 1953, p. 235-238.

Instrument and its operation. Photographs, diagram, graph. (Q25)

273-Q. An Apparatus for Determining Galling Characteristics and Measuring Coefficients of Kinetic Friction. W. C. Leone and F. F. Ling. *Society for Experimental Stress Analysis, Proceedings,* v. 11, 1953, p. 239-248.

Apparatus for making study of friction and galling characteristics of metals. Graphs, photographs, diagram, table. (Q9)

274-Q. The Hardness of Deuteron Irradiated Molybdenum. I. G. Geib, R. E. Grace and T. C. Harman. Paper from "Conference on Nuclear Engineering, 1953 Proceedings". University of California. p. E11-E24.

Effects of ambient vibrations, load, rate of loading, time of indentation, grain orientation and surface conditions on Vickers hardness number. Graphs, tables. 18 ref. (Q29, Mo)

275-Q. The Effect of Lubrication and Nature of Superficial Layer After Prolonged Periods of Running. F. T. Barwell. Paper from "Properties of Metallic Surfaces, Symposium". Institute of Metals, Monograph and Report Series 13. Institute of Metals, p. 101-122.

Various forms of wear. Taper sections provide evidence that failure proceeds in stages. Microscopic evidence of plastic flow of metal adjacent to a rubbing surface. Graphs, micrographs, photographs. 30 ref. (Q9)

276-Q. The Crystalline Character of Abraded Surfaces. P. Gay and P.

B. Hirsch. Paper from "Properties of Metallic Surfaces, Symposium". Institute of Metals, Monograph and Report Series 13. Institute of Metals, p. 123-132; disc., p. 295-364.

Effect of various abrasive treatments on surface structure of calcite were investigated by X-ray and electron diffraction methods. Tables, spectrographs, graph. 20 ref. (Q9, M26)

277-Q. The Effect of Surface Conditions on the Mechanical Properties of Metals, Mainly Single Crystals. E. N. da C. Andrade. Paper from "Properties of Metallic Surfaces, Symposium". Institute of Metals, Monograph and Report Series 13. Institute of Metals, p. 133-143.

With single crystals of metal a thin surface coating of oxide, and possibly of other salts, markedly increases both critical shear stress and stress required to produce further strain after considerable glide has taken place. Graphs. 21 ref. (Q25, Q2, Cd, Zn, Ag, Sn)

278-Q. The Influence of Surface Condition on the Fatigue Strength of Steel. R. J. Love. Paper from "Properties of Metallic Surfaces". Monograph and Report Series 13. Institute of Metals, p. 161-196.

Results have been obtained for carburizing, nitriding, cyaniding, flame hardening, and cold working by rolling, pressing or "presetting". Micrograph, tables. 157 ref. (Q7, ST)

279-Q. The Influence of Surface Films on the Friction and Deformation of Surfaces. F. P. Bowden and D. Tabor. Paper from "Properties of Metallic Surfaces, Symposium". Institute of Metals, Monograph and Report Series 13. Institute of Metals, p. 197-212; disc., p. 295-364.

In absence of all contaminating films, gross seizure occurs and sliding is impossible. At high speeds of sliding, high-temperature flashes are generated at regions of contact and the softened material is smeared over the surfaces to form Beilby layer. Graphs, micrographs, tables. 38 ref. (Q9)

280-Q. (German.) **The Effect of Chemical Composition of Unkilled Aged Steels on Notch Impact Strength.** Heinz Kornfeld. *Archiv für das Eisenhüttenwesen,* v. 24, nos. 11-12, Nov.-Dec. 1953, p. 469-474.

Impact-temperature curves of 234 steels used to show that effects of composition can be reduced to mathematical formulas. Tables, graphs. 5 ref. (Q6, CN)

281-Q. (German.) **The Effect of Manganese, Nickel, and Vanadium Together With Carbon on Wearing Behavior of Normalized Steels.** Heinrich Arend. *Archiv für das Eisenhüttenwesen,* v. 24, nos. 11-12, Nov.-Dec. 1953, p. 529-533.

Experimental arrangement. Results of wear tests. Tables, diagrams, graphs. 6 ref. (Q9, AY, Mn, Ni, V)

282-Q. (German.) **The Bauschinger Effect and Its Practical Results.** W. Späth. *Metall,* v. 8, nos. 1-2, Jan. 1954, p. 25-29.

Shows that monocrystals retain internal stresses even when a displacement was migrated through entire flow area. Effects of cold working. Graphs. 11 ref. (Q24)

283-Q. (German.) **Microhardness Testing in Theory and Practice.** E. M. Onitsch-Modl. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 19, no. 11, Nov. 1953, p. 330-343.

Theory, application and results. Graphs, micrographs, tables. 38 ref. (Q29)

284-Q. (German.) **Hardenability and Strength Properties of Alloyed Structural Steels.** Karl Bungardt, Heinz Kiessler and Ernst Kunze. *Stahl und Eisen,* v. 74, no. 2, Jan. 14, 1954, p. 71-76.

Correlation between hardenability and tensile and notch-impact strength of 12 steels. Tables, graphs. 18 ref. (Q23, Q6, Q27, J26, AY)

285-Q. (German.) **Creep of Steel Wires in Tensile Fatigue Region.** Rudolf Zinsser. *Stahl und Eisen,* v. 74, no. 3, Jan. 28, 1954, p. 145-151.

Steel with 0.39 to 0.76% carbon in form of drawn or heat treated wires was investigated. Photograph, tables, graphs, micrographs. 9 ref. (Q3, CN)

286-Q. (German.) **Laws of Plastic Deformation of Metals Under a Multiaxial State of Stress. II. Tensile and Torsion Experiments on Aluminum Cylinders.** Werner Sautter, Albert Kochendörfer and Ulrich Dehlinger. *Zeitschrift für Metallkunde,* v. 44, no. 12, Dec. 1953, p. 553-565.

Testing equipment. Test results agree with theory of flow, plasticity and deformation. Photographs, diagrams, graphs. 8 ref. (Q24, Al)

287-Q. (German.) **Crystal Growth and Plasticity.** W. Kossel. *Zeitschrift für Naturforschung,* v. 8a, no. 12, Dec. 1953, p. 815-823 + 4 plates.

Plastic deformation and crystal growth from a non-oriented phase are shown to be similar phenomena. Diagrams, micrographs. 9 ref. (Q24)

288-Q. Direct Fatigue Tests With Tensile and Compressive Mean Stresses on 24S-T Aluminium Plain Specimens and Specimens Notched by a Drilled Hole. Gunnar Wallgren. *Aeronautical Research Institute of Sweden, Report* no. 48, 1953, 29 p.

Results show that range of stress at constant lifetime is noticeably higher for a compressive mean stress than for a tensile mean stress of same magnitude. Graphs, photographs, diagrams, tables. 9 ref. (Q7, Al)

289-Q. Twelfth Progress Report of the Rolling-Load Tests of Joint Bars. R. S. Jensen. *American Railway Engineering Association, Bulletin,* v. 55, no. 514, Feb. 1954, p. 814-828.

Covers joint bar wear and failures; revision of design and specifications for new bars; and bars for maintenance repairs. Graphs, micrographs, phtographs, tables. (Q general, S22, CN)

290-Q. Twelfth Progress Report on Shelly Rail Studies at the University of Illinois. R. E. Cramer. *American Railway Engineering Association, Bulletin,* v. 55, no. 514, Feb. 1954, p. 832-840.

Results of rolling-load tests. Photographs, tables, micrographs. (Q general, S22, CN)

291-Q. Final Report on a Three-Dimensional Photoelastic Investigation of the Principal Stresses and Maximum Shears in the Head of a Model of a Railroad Rail. M. M. Frocht. *American Railway Engineering Association, Bulletin,* v. 55, no. 514, Feb. 1954, p. 854-885.

Photo-elastic study of stresses, in a model of the head of a railroad rail, utilizing recent developments in three-dimensional photoelasticity. Graphs, photographs, diagrams. (Q25, CN)

292-Q. A Plastic-Flow Problem Arising in the Theory of Discontinuous Machining. E. H. Lee. *ASME Transactions,* v. 76, Feb. 1954, p. 189-193; disc., p. 193-194.

Solution applies only while fracture surface is being deformed, before plastic flow spreads to initial work surface. Diagrams. 14 ref. (Q24, G17)

293-Q. Dynamic Properties of Nodular Cast Iron. II. Size Effect. Harry Majors, Jr. *ASME Transactions,* v. 76, Feb. 1954, p. 205-216.

Effect of test specimen upon dynamic stress-concentration factor of magnesium-treated cast iron having no nickel content. Graphs, photograph, photomicrographs, tables, diagrams. 26 ref. (Q25, CI)

294-Q. Deviations From Hooke's Law Within the "Elastic Range". Duncan Morrison. *Engineering,* v. 177, Jan. 29, 1954, p. 141-144.

Apparatus developed for measurement of very small plastic strains occurring in steel at stresses within the so-called "elastic limit". Such measurements are of particular interest in study of damping capacity or elastic hysteresis. Photographs, diagrams, graphs. (Q21, Q8, ST)

295-Q. On the Use of Hodographs in Problems of Plane Plastic Strain. A. P. Green. *Journal of the Mechanics and Physics of Solids,* v. 2, Jan. 1954, p. 73-80.

Properties and uses of the hodograph of velocity distribution in an ideal plastic-rigid body undergoing plane plastic deformation. Diagrams. 11 ref. (Q24)

296-Q. Calculations and Measurements on Wedge-Indentation. J. Grunzweig, I. M. Longman and N. J. Petch. *Journal of the Mechanics and Physics of Solids,* v. 2, Jan. 1954, p. 81-86.

Penetration, contact pressure and slip-line dimensions in plastic indentation by a rough wedge are calculated. Results compared with some experimental measurements. Tables, graphs. 2 ref. (Q24)

297-Q. The Plastic Torsion of Anisotropic Bars. R. Hill. *Journal of the Mechanics and Physics of Solids,* v. 2, Jan. 1954, p. 87-91.

Plastic state of stress examined in an anisotropic prismatic bar twisted by terminal couples. 7 ref. (Q24, Q1)

298-Q. Impact of Finite Beams of Ductile Metal. P. S. Symonds and C. F. A. Leth. *Journal of the Mechanics and Physics of Solids,* v. 2, Jan. 1954, p. 92-102.

Large plastic deformations of a beam under impact such as that due to a blow of a massive hammer, in which one cross section is suddenly forced to move with a given velocity, are discussed and analyzed. Diagrams, table, graphs. 9 ref. (Q6, Q24)

299-Q. On Eulerian Co-Ordinates in Elastic Wave Propagation. R. E. D. Bishop and J. N. Goodier. *Journal of the Mechanics and Physics of Solids,* v. 2, Jan. 1954, p. 103-109.

Stress wave passing through an elastic solid is considered by imagining the disturbance to be stationary and the solid to flow through it. 4 ref. (Q25)

300-Q. On Inoue's Hydrodynamical Analogy for the State of Stress in a Plastic Solid. R. Hill. *Journal of the Mechanics and Physics of Solids,* v. 2, Jan. 1954, p. 110-116.

Mathematical analogy between steady flow of a compressible fluid and equilibrium state of stress in a plastic solid. 9 ref. (Q25)

301-Q. Shells With Zero Bending Stresses. M. R. Horne. *Journal of the Mechanics and Physics of Solids,* v. 2, Jan. 1954, p. 117-126.

Shells of uniform thickness which will be free from bending stresses when the applied load is any uniform axial force are discussed. Graphs, diagrams, table. 1 ref. (Q5)

302-Q. On the Stress Distribution in the Walls of Pressure Vessels. H.

Fessler and R. T. Rose. *Journal of the Mechanics and Physics of Solids*, v. 2, Jan. 1954, p. 127-136.

Stresses in and near the hemispherical end of a pressure vessel of uniform wall thickness and mean diameter to thickness ratio of ten were determined by frozen stress photo-elastic method. Diagram, graphs, tables. 7 ref. (Q25)

303-Q. Influence of Heat Treatment and Cold Working on Tensile Strength Ranges. Robert L. Stedfeld. *Machine Design*, v. 26, Feb. 1954, p. 163-173.

Methods for raising strength levels for a number of materials and practical significance. Tables, graphs. 5 ref. (Q27)

304-Q. Slip Lines, Etchpits and Corrosion-Pits. A. H. Abdou. *Philosophical Magazine*, v. 45, 7th ser., no. 360, Jan. 1954, p. 105 + 1 plate.

Experiments show that etchpits grouped themselves preferentially along slip lines and certain grain boundaries in addition to a general random distribution. 4 ref. (Q24, Zn)

305-Q. Observations on the Fatigue Fracture of Copper. N. J. Wadsworth and N. Thompson. *Philosophical Magazine*, v. 45, 7th ser., no. 361, Feb. 1954, p. 223-224 + 1 plate.

Experiments on pure copper, fully annealed and tested at constant stress in push-pull at about 1000 cycles per sec. (Q7, Q26, Cu)

306-Q. Possible Sources of Error in Hardness Testing. K. Meyer. *Sheet Metal Industries*, v. 31, no. 322, Feb. 1954, p. 107-113. (Translated from the German by P. Grodzinski.)

Accuracies of basic instruments. Diagram, spectrographs, micrographs. 4 ref. (To be continued.) (Q29)

307-Q. Scratch Hardness Measurement With a Diamond Pyramid. T. Land and B. Sugarman. *Sheet Metal Industries*, v. 31, no. 322, Feb. 1954, p. 140-142, 158.

Evolution of an accurate instrument. Graphs, photographs. 2 ref. (Q29)

308-Q. Hardness Testing of Metals. Technical Papers and Exhibition in Sheffield. *South African Mining and Engineering Journal*, v. 64, pt. 2, Jan. 9, 1954, p. 699, 701.

Review of various aspects and inherent problems associated with accepted methods of hardness testing. (Q29)

309-Q. A Pinch of Boron Doubles Yield Point of Low-Carbon Steel. *Steel*, v. 134, Feb. 22, 1954, p. 107-108, 110.

Combination of 0.5% molybdenum and as little as an ounce of boron turned out to be the right one for a high-tensile, readily weldable steel. Photograph, tables, graph. (Q23, AY)

310-Q. (English.) **Work-Hardening in Stretched and Twisted Aluminium Crystals.** H. W. Paxton and A. H. Cottrell. *Acta Metallurgica*, v. 2, no. 1, Jan. 1954, p. 3-8.

Effects of plastic twisting on tensile deformation of aluminum crystals. Tables, graphs. 16 ref. (Q23, Q1, Al)

311-Q. (English.) **On the Strength of Solid Solution Alloys.** J. C. Fisher. *Acta Metallurgica*, v. 2, no. 1, Jan. 1954, p. 9-10.

Short-range order shown as important contributor. 4 ref. (Q23, M26)

312-Q. (English.) **The Formation of Mechanical Twins.** B. A. Bilby and A. R. Entwisle. *Acta Metallurgica*, v. 2, no. 1, Jan. 1954, p. 15-19.

Examination of stress fields arising during plastic deformation around inhomogeneities of the bounded slip and kink band types. Graphs, table. 16 ref. (Q24)

313-Q. (English.) **Slip Planes and the Energy of Dislocations in a Body-Centered Cubic Structure.** N. K. Chen and R. Maddin. *Acta Metallurgica*, v. 2, no. 1, Jan. 1954, p. 49-51.

Modified values of Chalmers and Martius parameter and ratio of Burgers vector to interplanar spacing for planes are derived assuming an alternate slip process. Table, diagram. 9 ref. (Q24)

314-Q. (English.) **Mechanical Deformation of Aluminium Bicrystals.** R. Clark and B. Chalmers. *Acta Metallurgica*, v. 2, no. 1, Jan. 1954, p. 80-86.

Specimens composed of two symmetrically oriented crystals having a common axis were subjected to a tensile test. Photograph, tables, diagrams, micrograph, graphs. 30 ref. (Q27, Al)

315-Q. (English.) **Crystallography of Deformation by Twin Boundary Movements in Indium-Thallium Alloys.** Z. S. Basinski and J. W. Christian. *Acta Metallurgica*, v. 2, no. 1, Jan. 1954, p. 101-116.

Geometrical effects of steps (twinning dislocations) in twin boundaries of face-centered tetragonal crystals. Diagrams, micrographs. 14 ref. (Q24, M26, In, Tl)

316-Q. (French.) **Interpretations of Variations in Resilience of a Metal as a Function of Temperature.** Marcel Prot. *Comptes rendus*, v. 238, no. 2, Jan. 11, 1954, p. 205-207.

Observations offer simple explanation for fractures in welded construction. Diagrams. 2 ref. (Q23, K general)

317-Q. (French.) **Influence of Gas Absorption on Mechanical Strength of Metal Wire.** Hubert Forestier and Auguste Clauss. *Comptes rendus*, v. 238, no. 2, Jan. 11, 1954, p. 207-209.

Establishes relation between fracture during stretching of fine wire and nature of gas present. Graph, diagram. 4 ref. (Q26)

318-Q. (German.) **On the Properties of Metal Melts. VII. Internal Friction of Molten Al and Al Alloys.** Erich Gebhardt, Manfred Becker and Stefan Dorner. *Zeitschrift für Metallkunde*, v. 44, no. 11, Nov. 1953, p. 510-514.

Experiments with a torsion-viscometer to determine internal friction of 99.996 aluminum and effect of copper, magnesium, iron, titanium and temperature on viscosity of the melt. Graphs, tables. 24 ref. (Q22, Al)

319-Q. (German.) **Disturbance of Slip in Al Monocrystals. II. Microscopic Investigation of Slip-Band Pictures and Discussion of Mechanism of Deformation.** Hansheinz Lange and Kurt Lücke. *Zeitschrift für Metallkunde*, v. 44, no. 11, Nov. 1953, p. 514-527.

Investigation revealed broken slip bands; band of second slippage; groups and streaks of slip bands; and double, transverse and unexpected slippage. Diagrams, graphs, micrographs. 29 ref. (Q24, Al)

320-Q. (German.) **Shear Deformation of Long Al Monocrystals.** Herbert Scholl. *Zeitschrift für Metallkunde*, v. 44, no. 11, Nov. 1953, p. 528-536.

Apparatus for measuring components of effective force and determining conditions under which shear occurs or crystals are bent. Results discussed. Diagrams, graphs, micrographs. 25 ref. (Q2, Al)

321-Q. (Russian.) **Relation Between Phenomena of Creep and Stress Relaxation in Metals.** I. A. Oding, O. V. Sorokin and N. D. Sazonova. *Doklady Akademii Nauk SSSR*, v. 92, no. 3, Sept. 21, 1953, p. 565-568.

Tests for creep and relaxation of austenite chromium-nickel steel after three separate heat treatments. Graphs. 4 ref. (Q3, SS)

322-Q. (Russian.) **Theory of Formation and Disintegration of Contact Bridges Between Surfaces During Friction.** M. P. Levitskii. *Doklady Akademii Nauk SSSR*, v. 92, no. 4, Oct. 1, 1953, p. 797-798.

Theoretical discussion on process of convergence of atomic lattices of surfaces during friction. Graph. 5 ref. (Q9, M25)

323-Q. (Russian.) **Effect of Hardening Temperature on Strength of High Speed Steel R9.** E. I. Malinkina. *Stanki i Instrument*, v. 24, no. 12, Dec. 1953, p. 21-23.

Torsion, tension, bending and impact properties shown to decrease sharply with increase of hardening temperature. Graphs, tables. 2 ref. (Q general, J26, TS)

324-Q. Strength of White Irons in the Temperature Range of Hot Tearing. J. P. Frenck and R. W. Heine. *American Foundryman*, v. 25, Mar. 1954, p. 68-72.

Tensile strength of white irons studied varied from nothing to several hundred pounds at temperatures of 2030 to 2200° F. Contraction of a few thousandths of an inch can cause complete tearing. Factors which influence hot tearing may be classified in two principal groups. Inherent characteristics of the metal and external factors not properties of the metal. Graphs, photomicrographs, diagrams, tables. 3 ref. (Q23, Q26, CI)

325-Q. A Tension Impact Test for Sheet Metals. Carl W. Muhlenbruch. *ASTM Bulletin*, 1954, no. 196, p. 43-49; disc., p. 49-50.

Method of machining fittings and specimens as well as permissible tolerances for satisfactory test results. Diagrams, photographs, graphs, tables. 2 ref. (Q6)

326-Q. Mechanism of Creep Deformation in High-Purity Aluminium at High Temperatures. Hsing C. Chang and Nicholas J. Grant. *Institute of Metals, Journal*, v. 82, Feb. 1954, p. 229-235 + 5 plates.

Tests were made at 400, 700 and 1100° F. with stresses from 50 to 1200 psi. Slip was found to be fundamental mechanism. Graphs, diagrams. 12 ref. (Q3, Q24, Al)

327-Q. Changes of Damping Capacity in Quench-Ageing Aluminium-Rich Alloys. K. M. Entwistle. *Institute of Metals, Journal*, v. 82, Feb. 1954, p. 249-263.

Tests conducted on duralumin at constant temperatures up to 65° C. Diagrams, graphs, table. 15 ref. (Q8, N7, Al)

328-Q. Some Metallographic Observations of the Creep of Aluminium—Copper Alloys. A. H. Sully and H. K. Hardy. *Institute of Metals, Journal*, v. 82, Feb. 1954, p. 264-265 + 2 plates.

Results of studies point to importance of grain-boundary stability in creep-resistant alloys. Table. 2 ref. (Q3, Al, Cu)

329-Q. The Creep Deformation of Metals Under Discontinuous Stress and Temperature Conditions. A. J. Kennedy. *Mechanical World and Engineering Record*, v. 134, Feb. 1954, p. 54-57.

Suggests that actual behavior of metals subjected to interrupted stresses may be very different from behavior deduced from standard creep tests. Graphs, diagrams. 4 ref. (Q3)

330-Q. Mechanical Properties of Iron-Chromium-Aluminum Ternary Alloys. I. I. Kornilov and V. S. Mikheev. *Henry Brutcher, Altadena, Calif., Translation no.* 3163, 15 p. (From *Stal*, v. 6, no. 2, 1946, p. 99-104.)

Investigation of hardness, notched-bar impact values, and tensile properties of ternary iron-chromium-aluminum alloys at room temperature and at temperatures up to 1830° F. Diagrams, graphs, tables, micrographs. 13 ref.
(Q29, Q6, Q27, Fe, Cr, Al)

331-Q. Microhardness of Siliconized Cases. N. S. Gorbunov, A. S. Akopdzanyan and N. A. Izgaryshev. *Henry Brutcher, Altadena, Calif., Translation no.* 3167, 4 p. (From *Doklady Akademii Nauk SSSR*, v. 91, no. 2, 1953, p. 285-286.)

Previously abstracted from original. See item 92-Q, 1954. (Q29, L15)

332-Q. (English.) **Analysis of Thin Square Plates Under Normal Pressure and Provided With Edge Frames of Finite Stiffnesses in the Plane of the Plates.** Sigge Eggwertz and Artur Norr. *Aëronautical Research Institute of Sweden, Report no.* 50, 1953, 34 p.

Formulas derived for deflections and membrane stresses including the influence of stiffness of the edge frame. Graphs, photographs, table, diagram. 21 ref. (Q23)

333-Q. (English.) **On the Internal Friction of Ferromagnetic Substances.** Nobuhiko Kunitomi. *Science Reports of the Research Institutes, Tohoku University*, Series A, v. 5, no. 4, Aug. 1953, p. 287-310.

Microscopic eddy currents calculated as a function of magnetization. Results compared with experimental data. Graphs, tables, diagrams. 20 ref. (Q22, P16, SG-n)

334-Q. (English.) **The Measurement of the Young's Modulus of Metals and Alloys by an Interferometric Method. III. The Influence of Heat-Treatment on the Young's Moduli of Fe-Al Alloys, and the Young's Moduli of Ni-Al, Al-Cu Alloys and German Silver in the Annealed State.** Tadao Fukuroi and Yoshio Shibuya. *Science Reports of the Research Institutes, Tohoku University*, Series A, v. 5, no. 5, Oct. 1953, p. 405-412.

Young's modulus studied as a function of heat treatment and alloy compositions. Graphs, tables. 11 ref. (Q21, Al, Cu, Fe, Ni, Zn)

335-Q. (Dutch.) **Chemical Composition and Mechanical Properties of Nodular Cast Iron.** J. Kol. *Metalen*, v. 9, no. 2, Jan. 31, 1954, p. 17-21.

Effects of annealing and of magnesium, silicon, carbon and sulfur. Graphs, tables. 19 ref. (To be continued.) (Q general, J23, CI)

336-Q. (Dutch.) **A Remark on the Temperature Dependence of Hardness.** E. D. Kunst. *Metalen*, v. 9, no. 2, Jan. 31, 1954, p. 23-24.

Sudden drop in Brinell hardness at about half the melting temperature on the absolute scale and impression depth as a function of applied load and time in seconds at different temperatures. Graphs. (Q29)

337-Q. (French.) **Stresses in Landing Gears.** A. Gentric. *Docaéro*, 1954, no. 25, Jan., p. 17-38.

Two different types of testing installations for measuring wheel-ground friction coefficients and fatigue rupture. Photographs, graphs, diagrams. (Q9, Q7)

338-Q. (French.) **Contribution to the Study of Elastic Modulus of Metal Alloys.** René Le Roux. *Métaux, Corrosion-Industries*, v. 28, no. 340, Dec. 1953, p. 489-505.

Variations of Young's modulus at room temperature permit observation of physico-chemical reactions of isothermic decomposition of a eutectoid. Florisson method and apparatus. Graphs, tables, diagrams, photograph. 40 ref. (To be continued.) (Q21)

339-Q. (French.) **Cold Sections. Methods of Investigation and Field of Economic Application.** R. J. Shaw and W. Shearer Smith. *Ossature metallique*, v. 18, no. 12, Dec. 1953, p. 609-613; disc., p. 613-616.

Presented at International Congress of Information Centers on Steel at Brussels. Discusses a "U" support compressed axially with respect to failure by buckling and torsion. Presents economic aspects of construction with steel sections. Photographs, graphs, diagrams. (Q28, Q1, ST)

340-Q. (Portuguese.) **Breaks in Ship Boiler Tubes. Studies Conducted in the Instituto Nacional de Tecnologia (Rio de Janiero) for the Purpose of Discovering Their Causes.** A. H. da Silveira Feijo, Silvia Maurell Lobo Radino, Maria Regina Veloso da Silveira, Enio Goulart de Andrade and Hugo Lodewijk Radino. *ABM (Boletim da associacao brasileira de metais)*, v. 9, no. 32, July 1953, p. 366-381.

Overheating shown to be principal factor. Steps for preventing it. Photographs, tables, graphs, micrographs. (Q26)

341-Q. (Book.) **Stress Concentration Design Factors.** R. E. Peterson. 155 p. 1953. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $8.50.

Information which will help in stress design calculations. (Q25)

342-Q. (Book—Italian.) **(Plastic Deformation of Metals.) Deformazioni Plastiche dei Metalli.** Sergio Descovich. v. I. 412 p. 1949. Istituto Siderurgico Finsider, Genoa, Italy.

Includes chapters on "Homogeneous Plastic Deformations of Single Crystals"; "Theory of Plastic Deformation of Single Crystals"; "Non-Homogeneous Deformations of Single Crystals. Alternating Deformations—Twinning"; "Plastic Deformations of Poly-Crystals"; "Creep in Polycrystalline Metals"; "Textures From Plastic Deformations"; "Stresses and Strains—Mechanics of Continuous Systems"; "Relations Between Stresses at Yielding"; "Principles of the Mathematical Theory of Plasticity"; and "The Plastic Deformation in the Tensile Test". Graphs, photographs, diagrams, tables. 584 ref. (Q24)

R
Corrosion

114-R. Corrosion by Water at Low Flow Velocity. T. E. Larson and R. M. King. *American Water Works Association, Journal*, v. 46, Jan. 1954, p. 1-9.

Need for fresh-water corrosion research. Experiments demonstrating the behavior of solutions at corrosion cell electrodes. Possible explanation for the inhibitory effect of bicarbonate and carbonate alkalinity. Graphs, photographs, table. 9 ref. (R4, CN)

115-R. Experimental Set-Up for Investigating Ash Deposition and Corrosion Phenomena on Gas-Turbine Materials at High Temperatures. C. Kind. *Brown Boveri Review*, v. 40, nos. 5-6, May-June 1953, p. 196-199.

Effect of fuel ash deposits on machine construction materials. Photographs, graphs. (R7, SS)

116-R. Cathodic Production. Economic Aspects of Corrosion Control. D. H. Lewis and O. C. Mudd. *Chemistry & Industry*, 1954, no. 4, Jan. 23, p. 93-100. (Paper read at a Symposium on Cathodic Protection, Corrosion Group of the Society of Chemical Industry at Institute of Electrical Engineers, London, Nov. 13, 1953.)

Stresses economic aspects of corrosion control and role of cathodic methods in a properly balanced program for protection of pipe lines and similar underground structures. Graphs, tables. (R10, CN)

117-R. Paint vs Corrosion—Some Aspects of the Problem in the Gulf Coast Area. V. B. Volkening. *Corrosion*, v. 10, Feb. 1954, p. 63-69.

Theory of metallic corrosion. Methods of testing and examples of coating successes and failures. Photographs, tables. 7 ref.
(R1, R11, L26)

118-R. The Measurement of Electrode Potentials. Norman Hackerman. *Corrosion*, v. 10, Feb. 1954, p. 70-72.

Few half cells of interest in corrosion measurements described in terms of preparation and use. Brief descriptions of potential measuring devices and their principles of operation. (R11)

119-R. Field and Laboratory Method for Investigating Corrosion. J. B. Armstrong. *Gas*, v. 30, Feb. 1954, p. 99, 101-102, 104.

Adapted from a paper presented at the annual meeting of the California Natural Gasoline Association, Los Angeles, Oct. 1953. Corrosivity evaluation and means of visual and instrument inspections. Photographs, diagrams. 4 ref. (R11)

120-R. Sensitive Corrosion Measurements With an Interferometer. *Glass Industry*, v. 35, Feb. 1954, p. 82, 106.

New techniques adaptable to optical glass, porcelain enamel, quartz and other natural and artificial silicates and various metals. Photographs. (R11)

121-R. Final Report on the Field Exposure Test Conducted by the IP Protectives Panel. *Institute of Petroleum, Journal*, v. 40, Jan. 1954, p. 32-36.

Conduct of test; results obtained. Tables. (R11, R3)

122-R. Combating Corrosion, A Special Symposium. *Oil and Gas Journal*, v. 52, Feb. 15, 1954, p. 122-130, 132, 134-136, 141-143, 145-150, 152-156, 159-160, 162-164.

Includes "Corrosive Oil and Gas Areas in the United States", D. A. Shock; "How to Get More Value From Paint", William T. Thies; "Protecting the Pipe-Line Protection", Frank B. Burns; "Management's Stake in Corrosion Mitigation", Lewis Finch, Jr.; "New Light on Asphalt Pipe-Line Coatings", H. C. McAninch; "How to Sell Management on Corrosion Mitigation", Ted L. Canfield; "Cold-Applied Coal-Tar Coatings", W. F. Fair, Jr.; "Organic Inhibitors in Oil and Gas Wells", P. D. Muir; "Semipolar Organic Inhibitors Check Corrosion", Charles M. Blair; "Microbiological Corrosion", J. Bennett Clark; "Cathodic Protection for Pipe Lines", B. J. Whitley, Jr.; "Fundamental Electrochemistry of Corrosion", Bernard O. Heston; "Good Design Now Will Stop Corrosion Later", F. A. Prange; "Hot Coal-Tar Coatings Approach Ideal", N. T. Shideler. Maps, diagrams, tables, photographs, graphs. 16 ref. (R general)

123-R. New Techniques—Current Problems in Controlling Corrosion. II. O. C. Mudd. *Pipe Line News*, v. 26, Feb. 1954, p. 34-39.

Effectiveness of corrosion control measures can be improved by modifications giving better results from materials and energy presently used in mitigation measures. Includes

construction features conserving protective current, adapting or designing accessory equipment to withstand destructure forces and choice of protective coating materials having good potential service life at a reasonable cost. Photographs, graphs, table. (R10)

124-R. Corrosion Insurance for Oil Storage Tanks. B. D. Allison. *Railway Track and Structures,* v. 50, Feb. 1954, p. 54-56.

Cathodic protection of storage facilities for diesel fuel. Photograph, diagrams. (R10, CN)

125-R. The Corrosion of Copper Tube Used in Soil-Stack Installations. H. E. Babbitt, E. R. Baumann and H. N. Hayward. *University of Illinois Bulletin, (Engineering Experiment Station Bulletin Series no. 419,)* v. 51, no. 17, Oct. 1953, 42 p.

Corrosion evaluation of 14 copper specimens made by visual observation, weight loss, increase of electrical resistance and depth of pitting. Tables, photographs, diagrams, graphs. (R11, Cu)

126-R. The Magnetic Oxygen Analyzer in Studies of Oxygen Uptake. Sam R. Hoover, Lenore Jasewicz and Mandor Porges. *Water & Sewage Works,* v. 101, Feb. 1954, p. 81-83.

New instrument for measuring aerobic oxidation rates. Graphs, photographs, table. (R2)

127-R. Chemical Behaviour as Influenced by Surface Condition. U. R. Evans. Paper from "Properties of Metallic Surfaces, Symposium". Institute of Metals, Monograph and Report Series 13. Institute of Metals, p. 253-280; disc., p. 295-364.

Effect of surface condition on corrosion probability, distribution and velocity. Micrographs. 61 ref. (R1)

128-R. (French.) Concerning Steels Resistant to Temperature Exceeding 450° C. II. Georges Vidal. *Chaleur & Industrie,* v. 34, no. 341, Dec. 1953, p. 350-356.

Corrosion resistance and strength of various steels. Graphs, photograph. 6 ref. (R11, Q23, SS)

129-R. (German.) The Oxidation Process in Titanium Carbide-Cobalt Hard Metals. Willy Kinna and Otto Rüdiger. *Archiv für das Eisenhüttenwesen,* v. 24, nos. 11-12, Nov.-Dec. 1953, p. 535-542.

X-ray, electron-ray, metallographic and ultramicroscopic investigations indicated parabolic law of oxidation in 600-1000° C. range. Tables, graphs, micrographs. (R2, Ti, Co)

130-R. (German.) Protection of Water Mains Against Corrosion. Report of the Second International Congress on Water Supply in Paris 1952. H. Steinrath. *Gas und Wasserfach,* v. 95, Ausgabe Wasser, no. 2, Jan. 15, 1954, p. 46-47.

Susceptibility of cast iron, steel and various types of concrete to soil corrosion. Efficiency of various protective coatings.
(R8, L general, CI, ST)

131-R. (German.) Corrosion Tests on Aluminum. *Metall,* v. 8, nos. 1-2, Jan. 1954, p. 31.

Effect of impurities on susceptibility of aluminum and aluminum alloys to corrosion. Table. 6 ref.
(R11, Al)

132-R. (German.) Local Tendencies of Solution Pressure of Metals to Change Under Slight Stresses. Paul Koch. *Metalloberfläche,* Ausgabe A, v. 8, no. 1, Jan. 1954, p. 1-7.

Investigations of effect of stresses on corrosiveness of metals. Table, diagrams, graphs. (To be continued.) (R1, Fe, ST, Ag, Cu, Pt)

133-R. (German.) Slagging of Gas Turbine Plants From Ashes of Fuels and Resulting Corrosion of Materials. J. Biert and R. Scheidegger. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 19, no. 12, Dec. 1953, p. 359-366.

Gas-flow disturbance, reduced efficiency and corrosion of heat resistant steel. Table, graph, diagram, photographs. 6 ref. (R7, SS)

134-R. (German.) Anodic Behavior of Nickel in Hydrochloric Acid, Sodium Chloride, and Nickel Chloride Solutions. Willi Machu and Adly Ragheb. *Werkstoffe und Korrosion,* v. 4, no. 12, Dec. 1953, p. 429-436.

Experiments showing action of nickel in acid and salt solutions. Tables, graphs. 12 ref. (R6, Ni)

135-R. (German.) Corrosion Problem. Bruno Waeser. *Werkstoffe und Korrosion,* v. 4, no. 12, Dec. 1953, p. 437-442.

Corrosion, prevention and resistance tests. 86 ref.
(R general, Cu, Ni, AY, Al, Mo, Zr)

136-R. (German.) The Mechanism of Oxidation and Corrosion Processes in Metals and Alloys. Karl Hauffe. *Zeitschrift für Metallkunde,* v. 44, no. 12, Dec. 1953, p. 576-583.

Shows that Wagner and Schattky's disorder theory can be used to explain corrosion mechanism. Discusses disorder phenomena in various oxides and high-temperature oxidation of various alloys. Graphs, diagrams. 37 ref.
(R2, N10, Ti, Ni, Fe, Ag, Cd, Br)

137-R. The Mitigation of Marine Fouling by Anaerobic Treatment. H. T. Duplice and R. C. Alexander. *ASME, Transactions,* v. 76, Feb. 1954, p. 241-243.

Deals with killing of marine fouling organisms, particularly the bay mussel, in salt cooling water conduits by anaerobic treatment. Graphs, photographs. 7 ref. (R1)

138-R. Reduction of Condensate-Line Corrosion. Scott Jensen and E. R. Lang. *ASME, Transactions,* v. 76, Feb. 1954, p. 245-249; disc., p. 249.

Progress in reducing iron and copper corrosion using ammonia, cyclohexylamine, morpholine and sodium sulphite. Diagrams, graphs, tables. (R10, Fe, Cu)

139-R. The Rate of Dissolution of Copper. Benjamin C. Y. Lu and M. F. Graydon. *Canadian Journal of Chemistry,* v. 32, Feb. 1954, p. 153-163 + 1 plate.

Rate of dissolution of polycrystalline metallic copper in sulphuric acid solutions determined as a function of temperature, oxygen pressure, rotation speed, hydrogen ion concentration, sample area and corroding solution volume. Graphs, micrographs, tables. 7 ref. (R11, Cu)

140-R. Cathodic Protection and Control of Corrosion in the Middle East. W. C. R. Whalley. *Chemistry & Industry,* 1954, no. 6, Feb. 6, p. 140-147.

Corrosion problems in buried oil pipes. Photographs, diagram, graphs, map. 1 ref. (R10)

141-R. Corrosion of Steel-Cored Aluminium Conductors. J. S. Forrest and J. M. Ward. *Engineering,* v. 177, Feb. 5, 1954, p. 183.

Methods of measuring corrosion. (R11, Al)

142-R. Vanadium. S. H. Frederick and T. F. Eden. *Iron & Steel,* v. 27, Feb. 1954, p. 67-69.

Corrosion aspects in gas turbines. Tables. (R general, V)

143-R. Stress-Corrosion of Aluminium-Magnesium Alloys. I. The Effect of Tensile Stress on the Corrosion of Aluminium-7%-Magnesium and Aluminium-5%-Magnesium Alloys. II. Methods for Expressing Stress-Corrosion Susceptibility on a Comparative Basis. E. Lloyd Jones. *Journal of Applied Chemistry,* v. 4, Jan. 1954, p. 1-10.

Wires were tested by immersion in 3% sodium chloride solution. Threshold stress values were determined. Local areas appeared more susceptible to attack. Tables, diagrams, graphs. 9 ref. (R1, Al, Mg)

144-R. Corrosion of Iron in the Presence of Dispersed and Solid Sulphur. Raymond B. Seymour, Walter R. Pascoe and Robert H. Steiner. *Journal of Applied Chemistry,* v. 4, Jan. 1954, p. 11-13.

Investigation undertaken to supply additional information and substantiate previous observations, and standard water works practice. Tables. 4 ref. (R6, CI)

145-R. Treatment of Cooling Waters. L. W. Fitzpatrick. *Power Engineering,* v. 58, Feb. 1954, p. 82-84.

Organic and inorganic corrosion and deposits in cooling towers. Photograph, tables. (R5)

146-R. Application of Aluminium in the Bleaching-Powder Industry. Y. C. Cheng and T. H. Taeng. *Sheet Metal Industries,* v. 31, no. 322, Feb. 1954, p. 143-150.

Tests show that bleach does attack aluminum but less than other materials. Tables, graphs, photographs. (R5, T29, Al)

147-R. (French.) Application of the Kinetics of Reaction to the Study of Corrosion. T. G. Owe Berg. *Journal de chimie physique,* v. 50, nos. 11-12, Nov.-Dec. 1953, p. 617-623.

Rates of dissolution of various metals in acid solutions were measured. Various aspects of process of dissolution. Graphs. 20 ref.
(R2, P13)

148-R. (Russian.) Influence of the Dimension of Test Specimens on the "Adsorption" and Corrosion Fatigue of Steel. G. V. Karpenko and A. V. Karlashov. *Doklady Akademii Nauk SSSR,* v. 92, no. 3, Sept. 21, 1953, p. 603-605.

Investigations on structural steel in water, air and oil. Method of testing. Results. Table, graphs. 3 ref. (R1, AY)

149-R. Corrosion for Chemical Engineers. I. Electrochemical Principles of Corrosion. L. L. Shreir. *Chemical & Process Engineering,* v. 35, Feb. 1954, p. 41-45.

Electrochemical considerations as theoretical background for subsequent articles. Diagrams, tables, graphs. 30 ref. (R1)

150-R. Chlorimet 3. Walter A. Luce. *Chemical Engineering,* v. 61, Mar. 1954, p. 254, 256, 258, 260.

Resistance of this important material of construction to a number of corrosives, with mechanical properties and applications in the chemical industry. Charts.
(R general, Q general, T29, Ni, Cr, Mo)

151-R. Evaluation of Several Sets of Constants and Several Sources of Variability. V. W. Vaurio and Cuthbert Daniel. *Chemical Engineering Progress,* v. 50, Feb. 1954, p. 81-86.

Test designed to establish sources of variation in prune-pack results described for tin-plate corrosion-resistance investigations. Tables, diagrams. 8 ref. (R11, CN, Sn)

152-R. Cathodic Protection as Applied to Royal Canadian Naval Vessels in Active Service. K. N. Barnard. *Chemistry & Industry,* 1954, no. 7, Feb. 13, p. 172-182.

Techniques of application, results obtained and advantages and disadvantages of systems employing magnesium, steel, graphite or platinum anodes. Diagrams, graphs, table. (R10, Mg, ST, Pt)

153-R. Cathodic Protection of Storage Tanks. B. D. Allison. *Diesel Power,* v. 32, Feb. 1954, p. 30-32.

Installation to protect diesel fuel oil and water storage tanks. Diagrams, table. (R10)

154-R. Vapor Phase Corrosion Inhibitors. I. D. G. Berwick and B. H. Levelton. *Engineering Journal,* v. 37, Feb. 1954, p. 128-131.

Vapor phase inhibitors must be stable, water-soluble and sufficiently volatile to maintain an adequate inhibiting concentration in atmosphere around metal to be protected. Photographs. 15 ref. (R10)

155-R. Thermodynamics of Irreversible Processes Applied to Corrosion. P. A. Johnson and A. L. Babb. *Industrial and Engineering Chemistry,* v. 46, Mar. 1954, p. 518-523.

Application of polarization data to determination of corrosion currents studied as a part of a survey of possible methods for measuring instantaneous corrosion rates of metals in solution. Diagrams, graph, table. 11 ref. (R11)

156-R. Action of Polar Organic Inhibitors. Norman Hackerman and A. C. Makrides. *Industrial and Engineering Chemistry,* v. 46, Mar. 1954, p. 523-527.

Theories of cathodic inhibition of corrosion, adsorption of polar organic inhibitors and applications of mechanism. 45 ref. (R10)

157-R. Corrosion Protection. *Metal Treatment and Drop Forging,* v. 21, Feb. 1954, p. 65.

Latest developments in industry. (R general)

158-R. Study and Recommendations and Methods of Treating Water for Diesel Locomotive Cooling and Steam Generator Feedwater System. H. M. Schudlich, chairman. Paper from "Official Proceedings of the 1953 Annual Meeting Master Boiler Makers' Association", p. 38-44; disc., p. 44-47.
(R4)

159-R. Corrosion Characteristics of Stainless Steels in Oxidizing Solutions (Corrosion in Nitric Acid Solutions). M. M. Kurtepov and G. V. Akimov. *Henry Brutcher, Altadena, Calif., Translation no.* 3078, 6 p. (From *Doklady Akademii Nauk SSSR,* v. 87, no. 1, 1952, p. 93-95.)

Experimental study of effects on corrosion rate of stainless steel by potassium dichromate, potassium permanganate, and ammonium vandate additions to nitric acid solutions. Tables, graph. (R6, SS)

160-R. Influence of Furnace Atmosphere on the Surface of Tube Rounds and Tubes. W. Scheurer. *Henry Brutcher, Altadena, Calif., Translation no.* 3086, 21 p. (From *Stahl und Eisen,* v. 72, no. 16, 1952, p. 935-941.)

Previously abstracted from original. See item 452-R, 1952.
(R2, J2, ST)

161-R. Testing of Metallic and Nonmetallic Protective Coatings for Corrosion Resistance in an Artificial Industrial Atmosphere. W. Kesternich. *Henry Brutcher, Altadena, Calif., Translation no.* 3086, 21 p. (From *Stahl und Eisen,* v. 71, no. 11, 1951, p. 587-588.)

Simple and rapid condensation test for effectiveness of metallic and nonmetallic protective coatings when exposed to various atmospheres. Photographs, graphs, diagram. 1 ref. (R3)

162-R. Contribution to the Problem of Corrosion Fatigue. G. V. Karpenko. *Henry Brutcher, Altadena, Calif., Translation no.* 3160, 4 p. (From *Doklady Akademii Nauk SSSR,* v. 79, no. 2, 1951, p. 287-288.)

Previously abstracted from original. See item 85-R, 1952. (R1, ST)

163-R. (French.) **Comparison of the Oxidation Mechanism of Iron-Chromium, Nickel-Chromium, and Nickel-Aluminum Binary Alloys.** Jean Moreau and Jacques Bénard. *Comptes rendus,* v. 237, no. 22, Nov. 30, 1953, p. 1417-1419.

Examination of specimens accomplished by X-ray diffraction and micrography of polished sections. Diagram. 4 ref.
(R2, M22, Fe, Cr, Ni, Al)

164-R. (German.) **The Passivity of Thallium in Perchloric Acid, Sodium Chloride, and Sodium Sulfate Solutions.** Willi Machu and Ezzat M. Khairy. *Werkstoffe und Korrosion,* v. 5, no. 1, Jan. 1954, p. 11-17.

Experiments prove two different phases occur in passivity. Diagram, graphs, tables. 9 ref. (R10, Ti)

165-R. (Italian.) **Theoretical and Experimental Study of Some Phenomena of Dezincification in Brasses. I. Types of Corrosion in Brasses—Dezincification. Causes and Theories.** Paolo Lombardi. *Metallurgia italiana,* v. 45, no. 12, Dec. 1953, p. 449-456.

Investigates various types of corrosion in copper-zinc alloys. Table. (To be continued.) (R2, Zn, Cu)

166-R. (Italian.) **High Temperature Oxidation of Cu-Al Alloys.** Paolo Spinedi. *Metallurgia italiana,* v. 45, no. 12, Dec. 1953, p. 457-461.

Experiments with various copper-aluminum alloys. Variations in weight as function of temperature were measured. Graphs. 15 ref.
(R2, Cu, Al)

S
Inspection and Control

109-S. Controlling Metal Quality at Ford's Cleveland Foundry. *Metal Progress,* v. 65, Feb. 1954, p. 87-89.

Use of the spectrometer. General foundry operations. Photographs. (S11, E general)

110-S. (German.) **New Applications of the Similarity Principle.** F. Schultz-Grunow. *Chemie-Ingenieur-Technik,* v. 26, no. 1, Jan. 1954, p. 18-24.

Applications to theory of flame propagation, rheological liquids, flow of molten glass, flow of liquid steel in the converter, effect of pulsating flow on coal dust combustion and fuel gas flow during corner burning. Graphs, tables, photographs, diagrams. 13 ref. (S18, ST)

111-S. (German.) **Measuring Wall Thickness of Steel Flasks in Production.** Franz Bollenrath and Viktor Hauk. *Archiv für das Eisenhüttenwesen,* v. 24, nos. 11-12, Nov.-Dec. 1953, p. 515-518.

Continuous method of measuring thickness with X-rays. Counting tube. Photographs, diagrams, graphs. 14 ref. (S14, ST)

112-S. (German.) **Theory and Practice of Materials Testing With Ultrasound.** H. J. Seemann and W. Bentz. *Metall,* v. 8, nos. 1-2, Jan. 1954, p. 1-11.

Effect of structure on extinction of elastic waves. Equipment, methods and practical uses. Diagrams, oscillograms, photograph. 25 ref. (S13)

113-S. (German.) **The Permeability of Steel to Ultrasound and Its Significance to Results of Impulse-Echo Testing Process.** Alfred Michalski. *Stahl und Eisen,* v. 74, no. 1, Jan. 1, 1954, p. 26-33.

Importance of distinguishing between real and pseudo obstructions. Various causes of poor ultrasound transmission. Micrographs, photographs, diagram, graphs. (S13)

114-S. (German.) **Experiences With Immersion Thermocouples.** Gerhard Eichert. *Stahl und Eisen,* v. 74, no. 2, Jan. 14, 1954, p. 95-98.

Surveys laboratory and plant experiences with operation between 1000 and 1700° C. Comparative temperature measurements of alloyed and unalloyed steel melts made with immersion thermocouple and color pyrometer. Diagrams, graphs, photographs. (S16, CN, AY)

115-S. Accuracy Limitations of Beta-Ray Thickness Measurement. L. Mandel. *British Journal of Applied Physics,* v. 5, Feb. 1954, p. 58-64.

Output fluctuations of beta-ray thickness gages and limitations they impose on accuracy of measurement. Graphs, diagrams. (S14)

116-S. Standards for Aluminium Casting Alloys. F. H. Smith. *Light Metals,* v. 17, Feb. 1954, p. 51-54.

Compares British and other specifications for quantities of composition elements. (To be continued.) (S22, Al)

117-S. Non-Destructive Testing. R. H. Warring. *Machinery Lloyd (Overseas Ed.),* v. 26, Jan. 30, 1954, p. 71-74.

Various methods and applications. Tables, diagrams. (S13, S14, S15)

118-S. Conforming Specifications for Cast Copper Base Alloys. *Materials & Methods,* v. 39, Feb. 1954, p. 137, 139.

Data sheet. Cross references specifications for various copper alloys. (S22, Cu)

119-S. Internal Microstrains and the Deformation and Failure of Metals. L. J. Dijkstra, U. Martius, B. Chalmers and P. E. Cavanagh. *Nondestructive Testing,* v. 12, Jan.-Feb. 1954, p. 13-18.

Usefulness of magnetic methods in estimating and measuring, by nondestructive methods, engineering service to be expected from steels. Micrographs, photograph, diagram. 3 ref. (S13, ST)

120-S. The Use of Artificially Produced Radioisotopes in Industrial Radiography. W. A. McCarthy. *Nondestructive Testing,* v. 12, Jan.-Feb. 1954, p. 19-20.

Comparison between cost, use and effects of isotopes, and radium and X-rays. 8 ref. (S13, S14, S15)

121-S. An Investigation of the Application of Iridium 192 Gamma Radiation to the Radiography of Light Metal Castings. Robert V. Wolf and Karl P. W. Wolf. *Nondestructive Testing,* v. 12, Jan.-Feb. 1954, p. 26-29.

An exposure chart for aluminum. Indications of penetrameter sensitivities for sections. Radiographs, graphs, tables. 9 ref. (S13, Al)

122-S. Ten Years' Cooperation Between the Society for Nondestructive Testing and the American Society for Metals. C. G. Lutts. *Nondestructive Testing,* v. 12, Jan.-Feb. 1954, p. 31-36.

History and early experiments in radiography. (S general, A2)

123-S. X-Ray Focal Spot Measurement. D. Polansky and D. T. O'Connor. *Nondestructive Testing,* v. 12, Jan.-Feb. 1954, p. 37-40.

Finite size of X-ray focal spot is critical factor in both radiography and fluoroscopy. Modern techniques place a greater emphasis on reduced focal spot size. Photographs, tables. 5 ref. (S13)

124-S. How to Chase a Pig Through a Pipe. Frank Chapman. *Nondestruc-*

tive Testing, v. 12, Jan.-Feb. 1954, p. 41-44.

Newly developed sonic listening device which logs progress of the pig through the line; and a Geiger counter, operating on radioactive radiation, to locate a stalled pig. Diagrams, photograph. (S19)

125-S. Spectroscopy of the Solid State: Some of the Transition Elements. E. M. Gyorgy and G. G. Harvey. *Physical Review*, v. 93, ser. 2, Feb. 1, 1954, p. 365-369.

Three *P* emission curves of nickel, manganese and iron have been obtained by using a vacuum-recording spectrograph. A plausible interpretation of a number of features of experimental bands. Diagrams, tables, oscillograms. 12 ref. (S11, Ni, Mn, Fe)

126-S. Carbide Tool Evaluation. H. O. Warnock. *Tooling and Production*, v. 19, Feb. 1954, p. 45-47, 169.

Tool evaluation as a quality control for the consumer and a process control for the manufacturer. Photographs, graphs. (S12, S18, SG-j)

127-S. How Quality Can Make or Break Carbide Tools. Alfred D. Stevens. *Tooling and Production*, v. 19, Feb. 1954, p. 52-55.

Usable life of a cemented carbide tool is dependent on proper application of its basic characteristics. Photographs, micrographs. (S12, S18, SG-j)

128-S. (Dutch.) Copper and Copper Alloys. XIII. Brass. W. G. R. De Jager. *Metalen*, v. 8, no. 21, Nov. 15, 1953, p. 390-392; v. 8, no. 23, Dec. 15, 1953, p. 426-427.

Composition of standard brasses of Germany, Great Britain and the U.S.A. Tables. (To be continued.) (S22, Cu)

129-S. (German.) Sheet-Metal Thickness-Measuring Instrument Especially for Measuring During the Rolling of Strip. N. de Ball. *Archiv für technisches Messen*, 1953, no. 215, Dec., p. 269-272.

Three different beta-ray and two different compressed-air measuring instruments. Photographs, table, diagrams. 10 ref. (S14, F23, Al, Cu, ST)

130-S. (German.) The Pair of Strips for the Mechanical Amplification of Small Displacements. Wilhelm Vogel. *Archiv für technisches Messen*, 1953, no. 215, Dec., p. 289-290.

Simple, rugged, sensitive and fairly accurate gage. Photograph, diagrams, graph. 4 ref. (S14)

131-S. Experiences With Ultrasonic Reflectoscope Inspection of Main Seam Welds of Seven Large Spheres. Levi Tarr. *ASTM Bulletin*, 1954, no. 196, p. 54-60; disc., p. 60.

Reflectoscope indications obtained in weld inspections are compared with radiographs, trepan plugs and Arcair gouging observations. Diagrams, photographs, tables, radiographs. (S13)

132-S. Non-Destructive Tests of Field Welds on Welded Pipe Lines. J. H. Lawson. *Australasian Engineer*, 1954, Jan., p. 57-60.

Recent developments in power station practice have led to adoption of radiographic examination of steam and feed piping operating at higher pressures and temperatures. (To be continued.) (S13, K general)

133-S. Standards of Temperature. II. R. E. Wilson. *Industrial Heating*, v. 21, Feb. 1954, p. 252, 254, 256, 258, 260, 384-386.

Calibration and certification of standard instruments used in maintenance of an expanded temperature scale. Photographs, diagram. (S16)

134-S. Light Metals Processing Quality Control. Harold Bourassa and Wesley Chellman. *Light Metal Age*, v. 12, Feb. 1954, p. 12-13, 32.

Correlation between every-day inspection operations and statistical quality control as foundation for control programs. Photographs. (S12, Al, Mg)

135-S. Process Analysis by Control Charts. Martin H. Saltz. *Tool Engineer*, v. 32, Mar. 1954, p. 66-71.

Development, interpretation and limitations of quality control charts. Statistical upper and lower tolerance limits. Graphs, charts, tables. (S12)

136-S. Ultrasonic Testing of Steel Rolls and Steel Cylinders. H. J. Seemann and W. Bentz. *Henry Brutcher, Altadena, Calif., Translation no.* 3118, 11 p. (From *Archiv für das Eisenhüttenwesen*, v. 24, nos. 1-2, 1953, p. 47-52.)

Previously abstracted from original. See item 199-S, July 1953. (S13, ST)

137-S. Electromagnetic Alternating-Field Technique for Nondestructive Testing of Ferrous Metals. H. Goebbels. *Henry Brutcher, Altadena, Calif., Translation no.* 3139, 17 p. (From *Archiv für das Eisenhüttenwesen*, v. 23, nos. 11-12, 1952, p. 443-448.)

Equipment developed by author for determining magnetic behavior in an alternating field. Photograph, graphs, diagrams, tables. 7 ref. (S13, Fe)

138-S. Procedure for Chemical Isolation of Iron Columbide From Austenitic Steel. A. M. Dymov and S. S. Gorelik. *Henry Brutcher, Altadena, Calif., Translation no.* 3164, 5 p. (From *Zavodskaya Laboratoriya*, v. 16, no. 6, 1950, p. 648-650.)

Development of qualitative method for isolating iron columbide from chromium-nickel-molybdenum austenitic steel containing columbium in quantities 16 to 20 times the carbon content. Micrographs. 2 ref. (S11, AY, Ni, Mo, Cr)

139-S. (Portuguese.) Roughness of Cast Metallic Pieces. Carlos Dias Brosch. *ABM (Boletim da associacao brasileira de metais)*, v. 9, no. 32, July 1953, p. 344-365.

Surface appearance factors, finishing operations and precision of dimensions. Methods of investigating roughness. Graphs, diagrams, tables, micrographs. 14 ref. (S15)

140-S. (Spanish.) Summary of Industrial Radiology. A. Ruiz Rubio. *Ciencia y técnica de la Soldadura*, v. 3, no. 15, Nov.-Dec. 1953, 30 p.

General review. Diagrams, graphs, tables. (S13)

141-S. (Book.) Higher Industrial Production With Electricity. 145 p. British Electrical Development Association, 2, Savoy Hill, London, W.C.2, England. 9s.

First of a projected series of eight volumes presents a general review of progress in industrial fields. Chapters are included on welding, factory layout, and electrical testing and inspection. (S general, K1, K3)

142-S. (Book.) The Instrument Manual. 2nd Ed. 628 p. 1953. Union Trade Press, Ltd., 9 Gough Square, Fleet St., London E.C.4, England. £4.4s.

Covers engineering precision instruments and gages; instruments for determining physical and mechanical properties; optical instruments; instruments for the determination of texture and determination of compositional quality; measurement and control of time and speed; measurement and proportioning of weight; measurement and control of pressure and vacuum, liquid level depth and volume, specific gravity of liquids, and of temperature; measurement of fluid flow; hydrogen ion concentration, and control of humidity and dew point; automatic control; electrical measuring, general electronic, aeronautical, navigational, meteorological, and surveying instruments; measurement and control of conductivity; telemetering; measurement of viscosity; nucleonic instruments; organizations and publications interested in instrumentation; and an alphabetical list of manufacturers. (S general)

143-S. (Book.) Methods for Emission Spectrochemical Analysis. ASTM Committee E-2 on Emission Spectroscopy. 309 p. 1953. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $5.15 cloth; $4.50 paper.

Suggested methods are based on experience of submitters. Presents pertinent information for each method to permit its application in various laboratories and with different types of equipment. (S11)

144-S. (Book.) 1953 Supplement to Book of ASTM Standards, Including Tentatives. pt. I. Ferrous Metals. 363 p. 1953. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

Contains extensively revised standards and the new and extensively revised tentatives that have been accepted since the appearance of the 1952 Book of ASTM Standards. (S22)

T Applications of Metals in Equipment

87-T. Jet Metals. William P. Brotherton. *Aero Digest*, v. 68, Feb. 1954, p. 40, 42, 44, 46.

New demands speed up search for alloys to meet jet-age needs. Reviews present applications. Photograph, graph. (T25, SS, Cr, Ni, Mo)

88-T. Metals Versus Plastics. Opening Contribution. S. Heslop. **Metals Versus Plastics. Contribution.** A. A. Tomkins. *Birmingham Metallurgical Society, Journal*, v. 33, Sept. 1953, p. 119-137.

The pros and cons of each material. Tables. 12 ref. (T general)

89-T. Magnesium for Electronics and Electrical Applications. *Magnesium*, 1954, Feb., p. 1-7.

In a steadily growing number of uses, no other metal can do the job as well. Photographs, diagrams. (T1, Mg)

90-T. Performance Evaluation of a Magnesium Alloy Truck Wheel. Marvin H. Polzin. *Society for Experimental Stress Analysis, Proceedings*, v. 11, 1953, p. 65-80.

Advantages of magnesium over steel, use of stresscoat and strain gages to locate and measure strains on the wheel during actual truck maneuvers, fatigue analysis and performance evaluation and relative merits of testing-to-failure methods and experimental stress analysis techniques. Photographs, diagrams, graphs. 15 ref. (T21, Q25)

91-T. Adaptation of Materials Selection Criteria to the Design of Reactor Core Components. J. P. Frankel. Paper from "Conference on Nuclear Engineering, 1953 Proceedings". University of California, p. E1-E10.

Importance of thermal stress in

addition to stress induced by load-carrying requirements of nuclear reactor components makes design difficult. Graph. 3 ref. (T25)

92-T. Metals for Reactor-Core Construction. Henry A. Saller. Paper from "Conference on Nuclear Engineering, 1953 Proceedings". p. 11-21. Sept. 9-11, 1953. University of California, Berkeley, Calif.

Status of various reactor materials are considered under classifications of fuels, cladding and structural materials, moderators and control materials. Tables. 16 ref. (T25)

93-T. (German.) **Cable With Pressed Aluminum Casing.** *Metall,* v. 8, nos. 1-2, Jan. 1954, p. 32-33.

Successful replacement of lead by aluminum as cable jackets. Mechanical properties of aluminum jackets. Table, graph, photographs. (T1, Q general, Al, Pb)

94-T. (Italian.) **Applications of Copper.** P. Lombardi. *Metallurgia italiana,* v. 45, Oct. 1953, p. 374-386.

Application for special conductors, various alloys and powder metallurgy. Diagrams, graphs, tables. (T general, Cu)

95-T. Effects of Methods of Manufacture and Steel Specifications on the Service of Disks. I. F. Reed and W. F. McCreery. *Agricultural Engineering,* v. 35, Feb. 1954, p. 91-94, 97.

Study indicates that manufacturers of disks should increase carbon content of their carbon steel disks to SAE 1085 or 1090 and heat treat to obtain hardness in range of Rockwell C-42 to 44. Photographs, tables, graphs. 4 ref. (T3, CN)

96-T. Prevention of Babbitt Blisters in Thrust-Bearing Pads. R. A. Baudry, D. W. Gunther and B. B. Winer. *ASME, Transactions,* v. 76, Feb. 1954, p. 255-260; disc., p. 260.

Investigation of processes to be used in manufacture of thrust-bearing pads that result in complete elimination of babbitt blistering. Photographs, diagrams, graphs. 15 ref. (T7)

97-T. Design of Steam Piping and Valves for 1100° F. F. A. Ritchings and Sabin Crocker. *ASME, Transactions,* v. 76, Feb. 1954, p. 261-271; disc., p. 271-277.

Reviews existing data. Speculates as to whether low-alloy ferritic steels could be made to serve the purpose. Graphs, tables. 34 ref. (T27, SS)

98-T. Titanium Outlook. Englebert Kirchner. *Aviation Age,* v. 21, Feb. 1954, p. 32-37.

Survey on titanium brings together opinions on aircraft usage held by airframe, engine and powerplant manufacturers. Photographs, charts. (T24, Ti)

99-T. American Applications of Boron and Other Low-Alloy Steels. H. B. Knowlton. *Iron and Steel Institute, Journal,* v. 176, Feb. 1954, p. 187-205; disc., p. 205-216 + 3 plates.

Presented at special meeting on "Boron in Steel", Iron and Steel Institute, April 1953, London. Graphs, tables, micrographs, diagrams. 27 ref. (T general, AY)

100-T. High Performance Jet Engine Design Dependent Upon Metallurgical Ingenuity. I. Perlmutter. *Journal of Metals,* v. 6, Feb. 1954, p. 113-118.

Use of metal alloys in aircraft turbine design. Tables, photographs, graphs, diagram. 4 ref. (T25)

101-T. Designing for Wear Resistance With Cemented Carbides. F. J. Lennon, Jr. *Machine Design,* v. 26, Feb. 1954, p. 176-179.

Carbide uses for machine components requiring wear resistance. Photograph. (T7, H general, Q9, C-n)

102-T. Stainless Steel Powder Magnetic Clutches. Alvin S. Weiss. *Product Engineering,* v. 25, Feb. 1954, p. 142-145.

Specialized application of a dry powder magnetic particle clutch utilizing stainless steel powder. Graph, table, photograph, diagram. 9 ref. (T7, H general, SS)

103-T. Concrete and Steel. R. F. Galbraith. *Times Review of Industry (Supplement),* 1954, p. 51-52.

Recent developments in technique of using these basic materials have caused significant changes in structural engineering practice. Photographs. (T26)

104-T. Discussion on Precision Spring Design. I. M. Gerard Fargemann. *Wire and Wire Products,* v. 29, Feb. 1954, p. 152-157, 207-209.

Results of experimental research. Basic spring design equations for main types of springs, including extension, compression, spiral, torsion and form springs. Table, diagrams, graph. (T7, Q general)

105-T. Steels for the Refractory and Heavy Clay Industries. G. W. Miles and W. B. Keith. *Edgar Allen News,* v. 33, Feb. 1954, p. 28-30.

Steels used in manufacture of brick molding machines. Micrographs, tables, photograph. (To be concluded.) (T29, ST)

106-T. High Strength Low Alloy Steel Railroad Cars Last Longer. J. W. Crossett. *INCO,* v. 26, no. 3, p. 4-6.

Includes photographs, table, graph. (T23, AY)

107-T. Chain for a Life Line. *INCO,* v. 26, no. 3, p. 16-17.

It is concluded that austenitic nickel-manganese steel machines at approximately twice the cost of nickel-chromium-molybdenum steel used for making nonmagnetic anchor chains. Photographs. (T7, G17, SS)

108-T. New Heat-Resistant Carbide May Increase Power of Jet Engines. *INCO,* v. 26, no. 3, p. 11, 26-27.

Kentanium may become the answer in search for a material superior to "super alloys" currently used in jet aircraft and gas-turbine engineering. Photograph. (T25, H general, Ti, C-n)

109-T. High Alloy Castings in Heat Treating Equipment. *INCO,* v. 26, no. 3, p. 12-13, 28-29.

High-alloy castings resist high-temperature conditions, reduce costs and prevent breakdowns. Photographs. (T5, J general, SG-h)

110-T. (French.) **Facing Buildings With Stainless Steel and Other Metals.** P. M. Slater. *Ossature metallique,* v. 18, no. 12, Dec. 1953, p. 616-620; disc., p. 620-622.

Presented at International Congress of Information Centres on Steel at Brussels. New method of constructing tall buildings with face lining of sheet steel. Economic aspects. Photographs, diagrams. (T26, SS)

111-T. (French.) **Cellular Bulkhead Structures of Steel Plate Piling.** L. Descans. *Ossature metallique,* v. 19, no. 1, Jan. 1954, p. 33-46.

Study of stresses in circular walls. Diagrams, graphs. 18 ref. (T26, Q25, ST)

112-T. (German and French.) **Light Metal in the Graphic Arts.** H. Marti. *Aluminium Suisse,* v. 3, no. 6, Nov. 1953, p. 200-201.

Use and advantages of aluminum furniture and base slugs in printing shops. Photographs. (T9, Al)

NATIONAL METAL CONGRESS
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V

Materials

General Coverage of Specific Materials

88-V. Electrical Steel—Triumph of Steelmaking, Heat Treatment and Scientific Metallurgy. William Jones. *Metal Progress,* v. 65, Feb. 1954, p. 70-74.

Portion of address at ASTM meeting, Oct. 15, 1953, St. Louis. Iron-silicon alloys and their use in magnetic core construction. Photographs, table. (T1, P15, AY)

89-V. Introducing: the New Self-Lubricating High Speed Steels. Stewart G. Fletcher. *Metal Progress,* v. 65, Feb. 1954, p. 161-162, 164, 166.

Improved machinability and internal cutting-edge lubrication are obtained with this new steel. Micrographs, table, photograph. (TS)

90-V. Low-Cost Alloys Offer Good Heat Resistance. R. W. Boring. *Iron Age,* v. 173, Feb. 18, 1954, p. 137-141.

Knowledge of physical, mechanical, chemical and metallurgical properties of wrought heat resistant alloys can aid considerably in proper selection and pay off well in savings of time and money. Photographs, tables. (SS)

91-V. The Manufacture and Use of Boron Steels in the U.S.A. Louis J. Rohl. *Iron and Steel Institute, Journal,* v. 176, Feb. 1954, p. 173-180; disc., p. 180-187.

Presented at special meeting on "Boron in Steel", Iron and Steel Inst., Apr. 1953, London. Survey of development of boron steels as a means of conserving critical alloys. Methods of manufacture using simple and complex boron ferroalloys. Tables, graphs, diagrams, micrographs. 10 ref. (D general, T general, AY)

92-V. Titanium Alloys Give Promise of High Temperature Applications. F. A. Crossley and H. D. Kessler. *Journal of Metals,* v. 6, Feb. 1954, p. 119-121.

Condensed from a paper presented at the AIME Institute of Metals Div. meeting, Cleveland, Oct. 21 to 23, 1953. Comparison of experimental alloys with some commercial types. Tables, graphs. 5 ref. (T general, Ti)

93-V. High-Strength Low-Alloy Steels. *Materials & Methods,* v. 39, Feb. 1954, p. 117-132.

General characteristics, corrosion resistance, special service properties, joining and working characteristics, design considerations, applications and economics of use. Photographs, tables, graphs. 22 ref. (AY)

94-V. Metallurgical Aspects of High Temperature Steam and Gas Turbine Plants. J. M. Robertson. *North East Coast Institution of Engineers & Shipbuilders, Transactions,* v. 70, Feb. 1954, p. 217-252.

Composition, mechanical properties, corrosion, heat treatment and welding of steels and other alloys for use above 850° F. Graphs, tables. (SG-h, SS, Ni, Co, Cr)

95-V. How to Classify Copper Base Alloys. III. *Steel,* v. 134, Feb. 15, 1954, p. 114-115, 118.

Most copper-base compositions for castings are mixed brass and bronze. Usually in the alpha range, alloys often contain lead and other minor ingredients. Photographs, table. (Cu)

(Continued on p. 62)

EMPLOYMENT SERVICE BUREAU

The Employment Service Bureau is operated as a service to members of the American Society for Metals and no charge is made for advertising insertions. The "Positions Wanted" column, however, is restricted to members in good standing of the A.S.M. Ads are limited to 50 words and only one insertion of any one ad. Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, O., unless otherwise stated.

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POSITIONS WANTED

METALLURGIST: B.S. degree, some graduate study. Age 31, married, children. Five years mill experience, three years as supervisor in automotive industry. Well-versed in steel heat treatment, laboratory procedures, nondestructive testing and trouble shooting production problems. Prefers supervisory position or one with responsibilities utilizing heat treating experience. Will relocate. Box 4-60.

METALLURGICAL ENGINEER: B.S. degree, age 29, married, two children. Teaching experience in materials and methods. Experienced in research and development work concerning melting, casting, rolling and drawing of high-temperature alloys. Consulting experience on all phases of manufacturing, materials and design problems. Considerable experience in the drawing of high-nickel alloy wire. Interested in relocating to Midwest. References and resume available. Box 4-65.

METALLURGIST: Graduate with 13 years broad metallurgical experience and consulting. Specialist in welding, brazing and soldering most alloys. Author of papers. Ability to execute projects and trouble shoot shop problems. Can supervise laboratory, write lucid reports and specifications. Prefers peacetime business. Will consider outside U. S. Box 4-70.

METALLURGIST: B.S., M.S., Ph.D. degrees in metallurgy. Permanent resident alien, age 35, married, one child. Eight years in nonferrous and corrosion research. Knowledge of corrosion, hydro and electrometallurgy, radiography, X-ray diffraction, spectrography and heat treatment. Desires position in research, production or plant control with opportunities for experience and advancement. Box 4-75.

METALLURICAL ENGINEER: B.S. degree, married. Experience includes 1½ years basic steel mill, four years tubing specialities, carbon, alloy and stainless, most recently specifications and order set-ups. Prefers position in West or Midwest. Box 4-80.

METALLURGICAL ENGINEER: B.S. in metallurgical engineering, age 48, married, children. Has had 24 years of diversified supervisory experience in steel mill and forge shop. Well-versed in manufacturing processes, heat treating, physical metallurgy, trouble shooting. Desires position combining technical knowledge and general management administration. Prefers Midwest, but will relocate. Box 4-85.

METALLURGICAL ENGINEER: B.S. in metallurgical engineering, Lehigh University. Age 29, married. Two years experience in heat treating development work. Desires additional experience in heat treating and related fields. Also holds degree in business administration majoring in cost accounting and industrial management. Knowledge of statistics. Southeastern Pennsylvania preferred. Box 4-90.

METALLURGICAL ENGINEER: B.M.E. degree, age 27, married. Experience includes 3½ years diversified foundry, heat treating and welding work, 2½ years ordnance research and development. Presently employed, desires position in any of above fields. Box 4-95.

METALLURGICAL ENGINEER: B.S. degree, age 32, married, two children. Five years experience in research, development and production of steel castings. Experience includes supervision, technical report writing, heat-treating, foundry and sand problems, X-ray, chemical analysis and metallography. Some experience in nonferrous with forgings and castings. Desires development or production in Midwest. Box 4-100.

METALLURGICAL ENGINEER: B.S. degree, age 24, married, draft exempt. Employed in heat treating department in aircraft engine plant. Experience in electroplating copper, nickel, chromium, cadmium, etc., plus decorative and corrosion resistant anodizing. Prefers production or development in electroplating or metallurgy in Chicago area. Box 4-105.

METALLURGICAL ENGINEER: B.S. degree, age 39, married, children. Has had 16 years diversified experience in research, development, production and quality control. Includes nine years supervisory experience in precision instrument and airframe industries. Capable of handling supervisory position in laboratory, development engineering or quality control. Prefers Northeast area. Box 4-110.

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METALLURGICAL ENGINEER: B.S. and business administration degree, age 32, single. Ten years experience in electronic tube pilot plant and manufacturing, Navy electronic training, organic finishing, electroplating, metallic materials application. Desires position which will effectively utilize engineering education, industrial experience and graduate training in business administration. Box 4-120.

METALLURGICAL ENGINEER: B.S. degree, age 24, married. Will be discharged from Army on Aug. 1, 1954. Six months experience in large steel mill. Two years in investigation of ordnance equipment failures and metallurgical control in the production of artillery ammunition components at a government arsenal. Desires production work in ferrous metallurgy. Box 4-125.

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METALLURGICAL ENGINEER: Age 29, married, family. B.S. degree in metallurgical engineering. Five years diversified experience including process and product control and development in integrated basic steel plant, some contact work. Desires position in production and/or development. Prefers western Pennsylvania area. Box 4-140.

METALLURGIST: B.S., M.S. degrees and completing work on D. Eng. degree, majoring in metallurgy. Age 32, married, three children. Desires research and/or development position in industry or university. Experience includes three years army service, three years industrial stainless steel research and four years university teaching and research. Specialized experience in metallography, X-ray diffraction, radiography, heat treating, mechanical testing. Box 4-145.

METALLURGIST: Age 31, married, child. M.S. degree. Three years as lab instructor in metallography, 1 year research assistant, 2½ years heat treating field including operation of small heat treat shop as partner. Seeks position with responsibility and future, preferably in research and development. Prefers Philadelphia area. Complete resume available. Box 4-160.

METALLURGIST: Age 27, married, B.S. degree in physics and chemistry, ability in languages. Metallurgical laboratory assistant in acceptance of aircraft quality castings for two years. Relocate if necessary. Seeking opportunity. Box 4-165.

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(*continued from p. 60*)

96-V. Way to Save Nickel. *Steel,* v. 134, Feb. 15, 1954, p. 122.
New alloying technique. Photographs. (Ni)

97-V. Aluminum 195. (Heat Treatable Sand Casting Alloy). *Alloy Digest,* no. AL-14, Mar. 1954.
Composition, physical constants, ability, weldability, general characproperties, heat treatment, machinteristics and applications. (Al)

98-V. Stressproof. (A High Strength, Free-Machining Bar Steel). *Alloy Digest,* no. CS-2, Mar. 1954.
Composition, physical constants, properties, machinability, characteristics and applications. (CN)

99-V. Inconel (Corrosion-Resistant Nickel Alloy). *Alloy Digest,* no. NI-9, Mar. 1954.
Composition, physical constants, properties, heat treatment, workability, machinability, corrosion resistance, weldability, general characteristics and applications. (Ni)

100-V. AISI 8640. (Oil Hardening Triple Alloy Steel). *Alloy Digest,* no. SA-15, Mar. 1954.
Composition, properties, heat treatment, machinability, weldability and general characteristics. (AY)

101-V. Misco Metal. (Heat and Corrosion Resistant Steel). *Alloy Digest,* no. SS-13, Mar. 1954.
Composition, physical constants, properties, machinability, weldability and applications. (SS)

102-V. Sparta. (Air Hardening Die Steel). *Alloy Digest,* no. TS-18, Mar. 1954.
Composition, properties, heat treatment, workability, machinability, applications, characteristics. (TS)

103-V. Pressurdie-3. (Pressure Die Steel). *Alloy Digest,* no. TS-19, Mar. 1954.
Composition, properties, heat treatment, machinability, uses. (TS)

104-V. Titanium: Progress, Problems, Prospects. Harries-Clichy Peterson. *Analysts Journal,* v. 10, Feb. 1954, p. 61-65.
Developments and uses. (Ti)

105-V. Silver. Roberto Antoniolli. *Canadian Mining and Metallurgical Bulletin,* v. 47, no. 502, Feb. 1954, p. 94-105.
Production, consumption, availability and applications. Tables, graphs. 55 ref. (Ag)

106-V. Toward a System of Zirconium Chemistry. Warren B. Blumenthal. *Industrial and Engineering Chemistry,* v. 46, Mar. 1954, p. 528-539.
General discussion of zirconium, its compounds and their properties with emphasis on electrochemistry. Photograph. 67 ref. (P15, Zr)

107-V. Titanium Progress in 1953. T. W. Lippert. *Light Metal Age,* v. 12, Feb. 1954, p. 16-17.
Production, needs and advancements made in past year. Photographs. (Ti)

108-V. (Book.) **Engineering Steels.** Leslie Aitchison and William I. Pumphrey. 923 p. 1953. MacDonald & Evans, Ltd., Bedford Row, W.C.1, London, England. Available from British Book Centre, 420 W. 45th St., New York 36, N. Y. $15.75.
A study of the properties of steels and the principles governing their selection for engineering applications. Manufacture, fabrication, heat treatment, metallurgy. (ST)

109-V. (Book—German.) **(Comprehensive Treatise on Ferrous Metallurgy.) Gemeinfassliche Darstellung des Eisenhüttenwesens. Ed. 16.** Society of German Metallurgists. 581 p. 1953. Verlag Stahleisen M.B.H., Düsseldorf, Germany. DM38.50.
Guide for laymen, commercial engineers, students and expert metallurgists. Synopsis of entire field. Graphs, illustrations, tables. (Fe)

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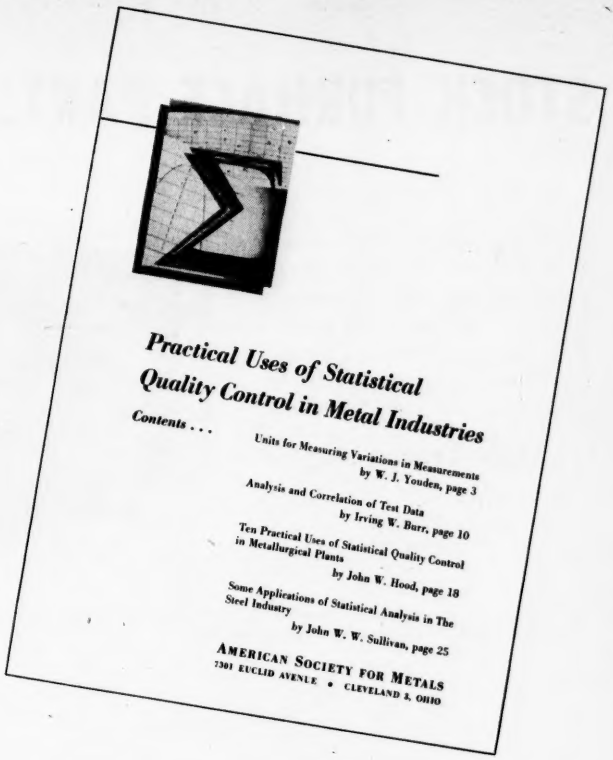
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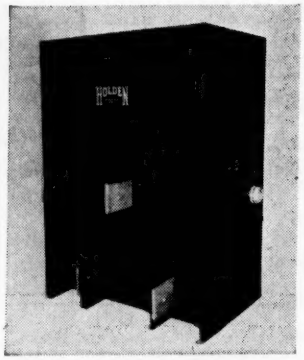

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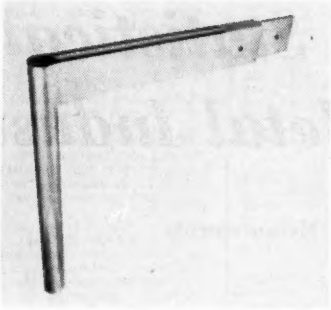

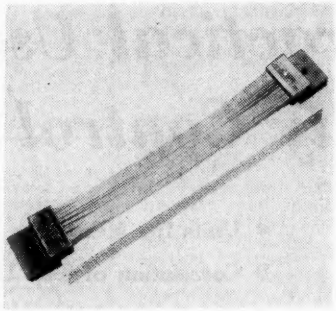

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